

**Report Title**

“Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico”

**Type of Report**

Third Quarterly Progress Report for Year 3

**Reporting Period Start Date**

November 1, 2005

**Reporting Period End Date**

January 31, 2006

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**Date Report was Issued**

February 28, 2006

**DOE Award Number**

DE-FC26-03NT15395

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## **Abstract**

The principal research effort for Year 3 of the project is basin modeling and petroleum system identification, comparative basin evaluation and resource assessment. In the first six (6) months of Year 3, the research focus is on basin modeling and petroleum system identification and the remainder of the year the emphasis is on the comparative basin evaluation and resource assessment. No major problems have been encountered to date, and the project is on schedule.

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# **“Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico”**

Third Quarter Report for Year 3  
November 1, 2005—January 31, 2006

## **Introduction**

The University of Alabama and Louisiana State University have undertaken a cooperative 5-year, fundamental research project involving sedimentary basin analysis and petroleum system characterization and modeling of the North Louisiana Salt Basin and Mississippi Interior Salt Basin. According to the USGS, the hydrocarbon volume of these basins ranks them in the top 8% of the most petroliferous basins of the world.

## **Executive Summary**

The principal research effort for Year 3 of the project is basin modeling and petroleum system identification, comparative basin evaluation and resource assessment. In the first six (6) months of Year 3, the research focus is on basin modeling and petroleum system identification and the remainder of the year the emphasis is on the comparative basin evaluation and resource assessment. No major problems have been encountered to date, and the project is on schedule.

## **Project Objectives**

The principal objectives of the project are to develop through basin analysis and modeling the concept that petroleum systems acting in a basin can be identified through basin modeling and to demonstrate that the information and analysis resulting from characterizing and modeling of these petroleum systems in the North Louisiana Salt Basin and the Mississippi Interior Salt Basin can be used in providing a more reliable and advanced approach for targeting stratigraphic traps and specific reservoir facies within a geologic system and in providing a refined assessment of undiscovered and underdeveloped reservoirs and associated oil and gas resources.

## **Experimental**

### Work Accomplished

*Comparative Basin Evaluation* –Basin geohistory modeling (burial and thermal maturation history modeling) and petroleum system characterization and modeling (hydrocarbon generation and expulsion modeling) of the Mississippi Interior Salt Basin (Figure 1) have been revised using the methodology used in the basin modeling and petroleum system characterization and modeling of the North Louisiana Salt Basin. The basin and petroleum system modeling has been accomplished by using software developed by Platte River. The modeling is based on the methodologies of Roger Barnaby at LSU. His methodologies include procedures for estimating the amount of erosion, the amount of sediment compaction, the lithologies of the stratigraphic units, the thermal conductivities of the rock units, the present day heat flow, the paleoheat flow,

the original percent of total organic carbon in the source rocks, and the percent of oil saturation in the source rock. The results from this work are as follows: burial history modeling (Figures 2-49), and petroleum system modeling (Figures 50-142).

### Work Planned

*Comparative Basin Evaluation*– The work comparing the revised basin modeling and petroleum system characterization and modeling in the Mississippi Interior Salt Basin to that of the North Louisiana Salt Basin will be completed (Table 1).

*Resource Assessment*– The work to determine the undiscovered and underdeveloped reservoirs in the North Louisiana Salt Basin using the results from the basin analysis and modeling will be initiated and completed.

**Table 1**  
**Milestone Chart—Year 3**

	M	J	J	A	S	O	N	D	J	F	M	A	
Basin Modeling & Petroleum System Identification	<div></div>												
	xxx xxx xxx xxx xxx xxx												
Comparative Basin Evaluation							<div></div>						
							xxxxxxxxxxxxxxxx						
Resource Assessment													
							<div></div>						
Work Planned	<div></div>												
Work Accomplished	xxx												

### **Results and Discussion**

No major problems have been encountered at this point.

## Conclusions

The project work is on schedule.

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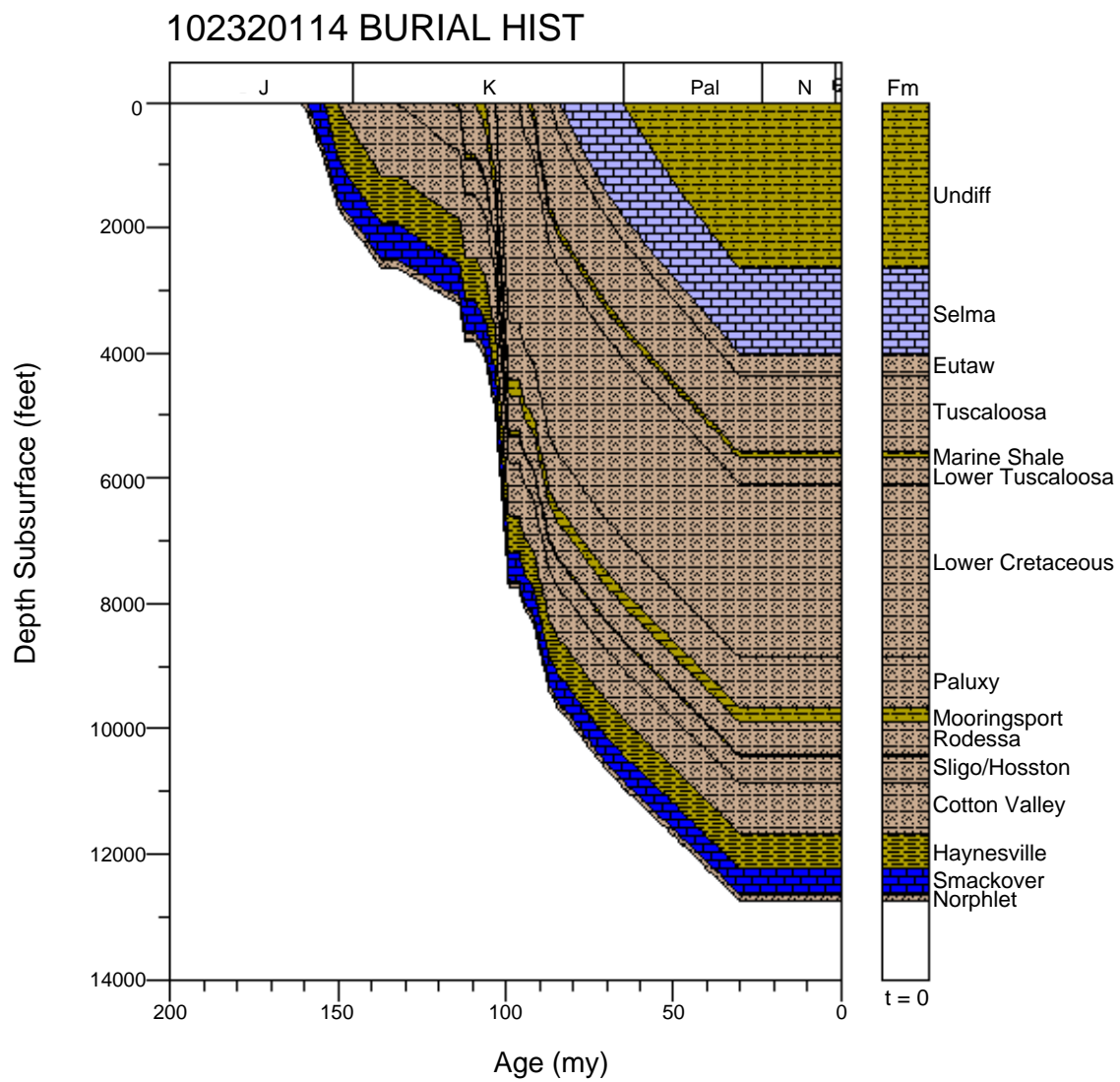


Figure 2. Burial history for well 102320114, Mississippi Interior Salt Basin.

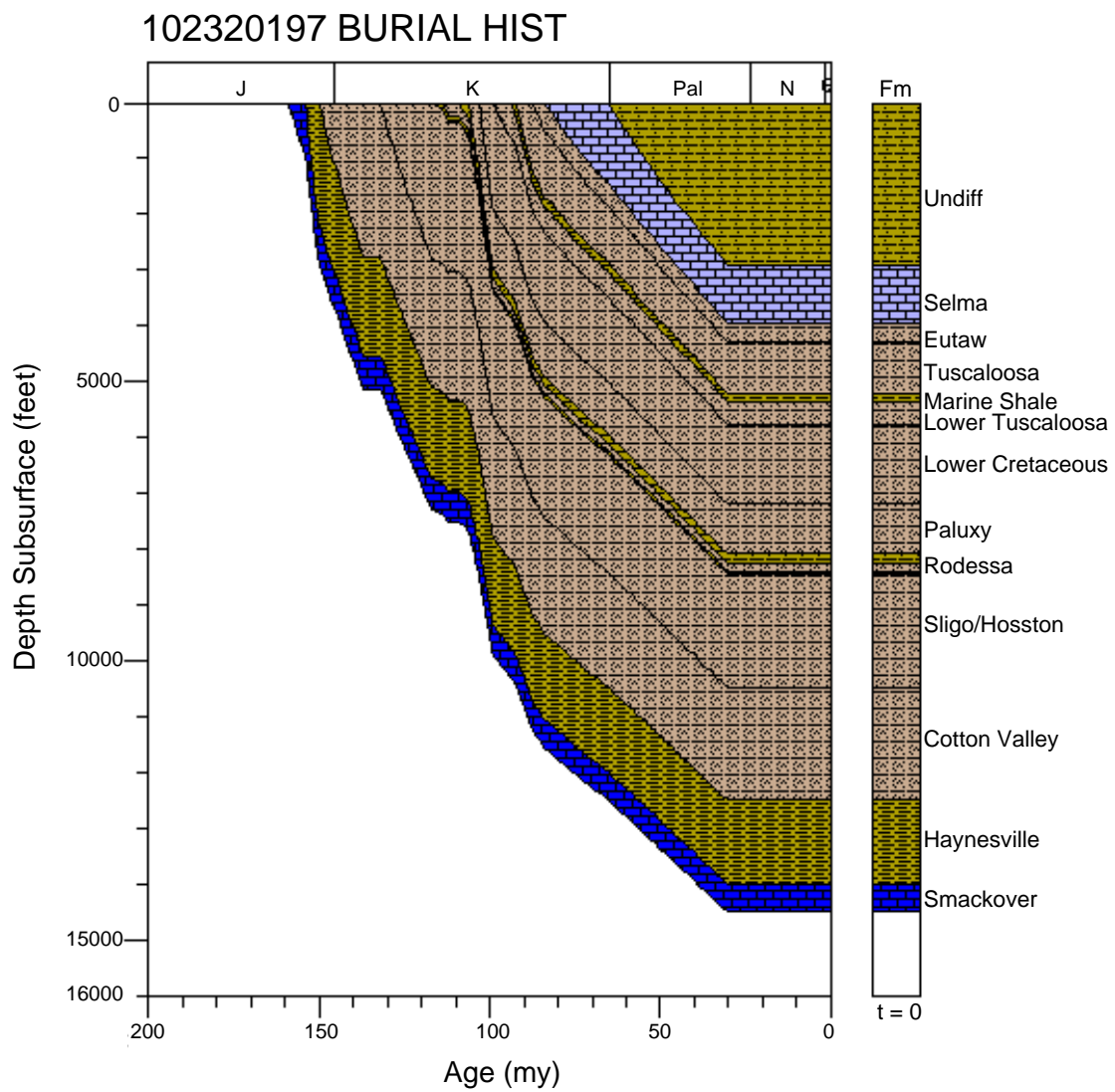


Figure 3. Burial history for well 102320197, Mississippi Interior Salt Basin.

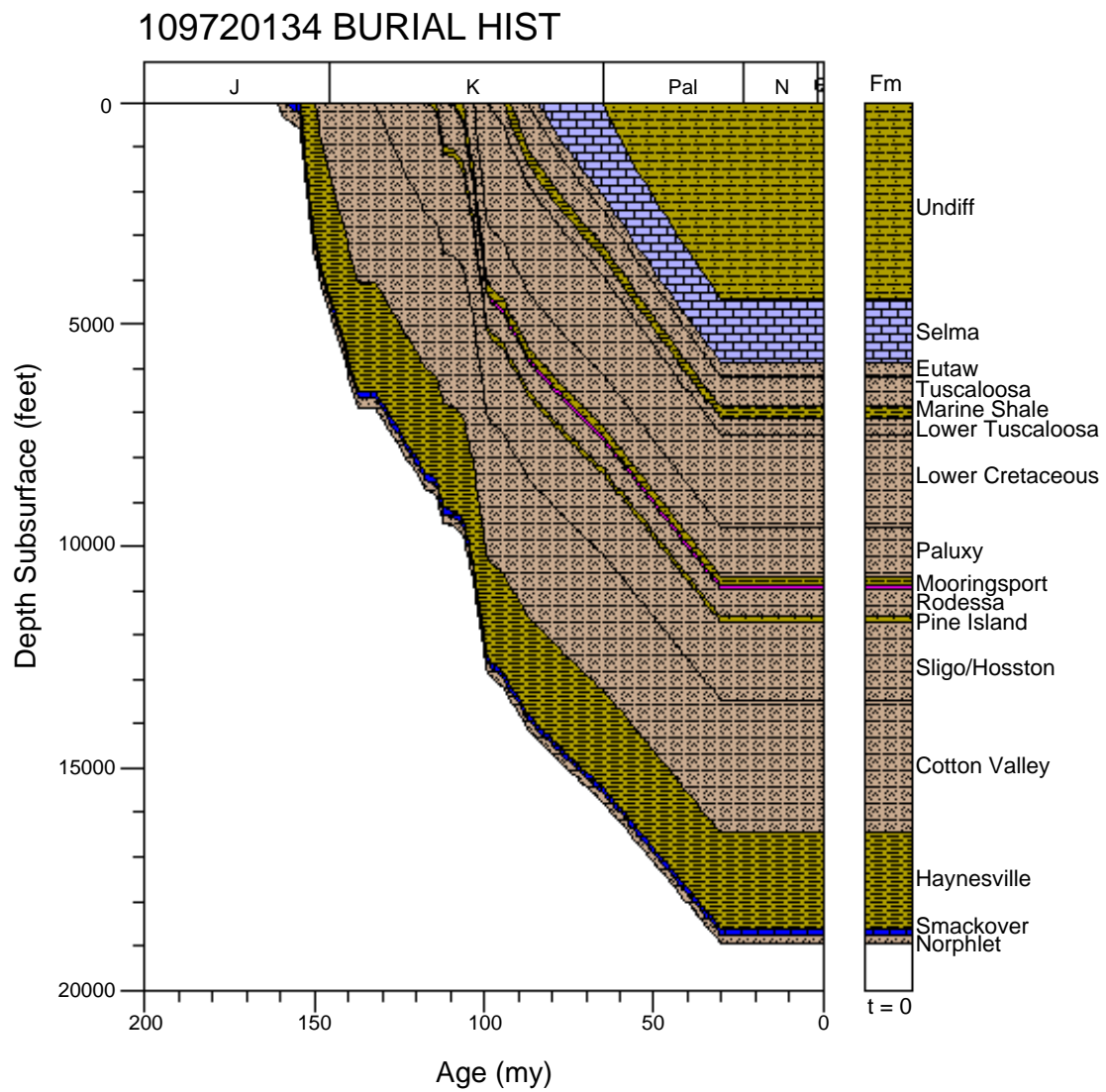


Figure 4. Burial history for well 109720134, Mississippi Interior Salt Basin.

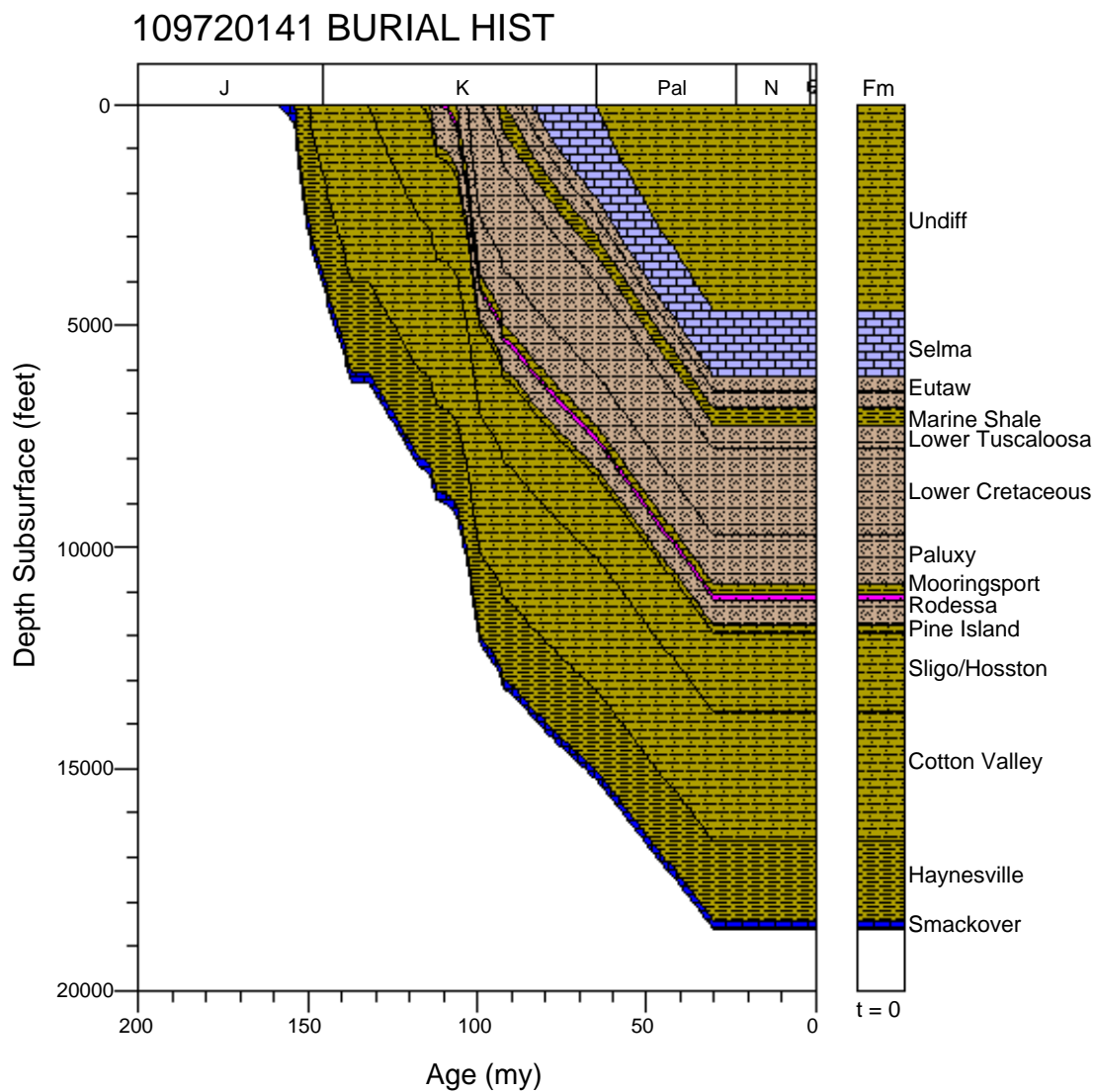


Figure 5. Burial history for well 109720141, Mississippi Interior Salt Basin.

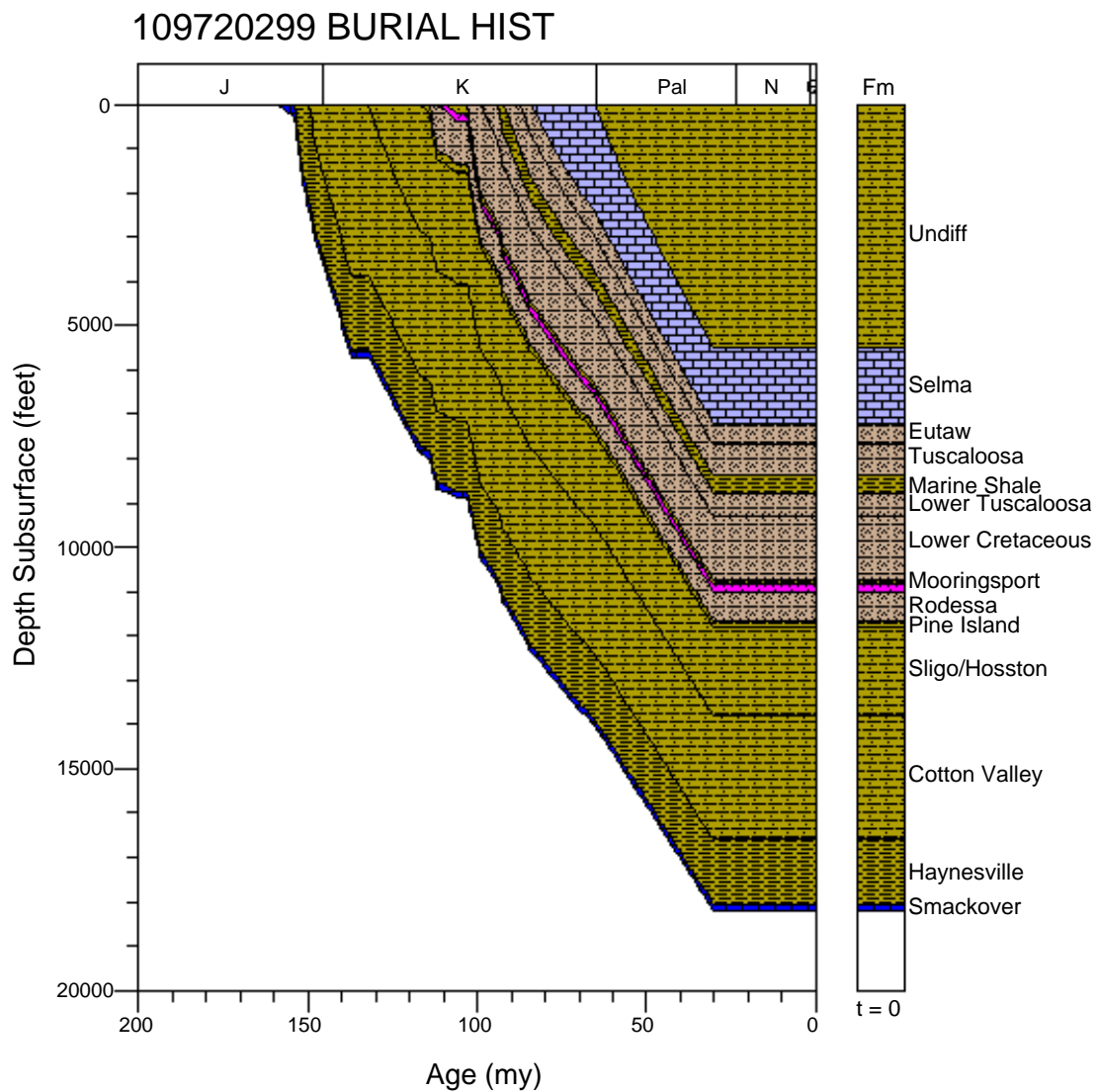


Figure 6. Burial history for well 109720299, Mississippi Interior Salt Basin.

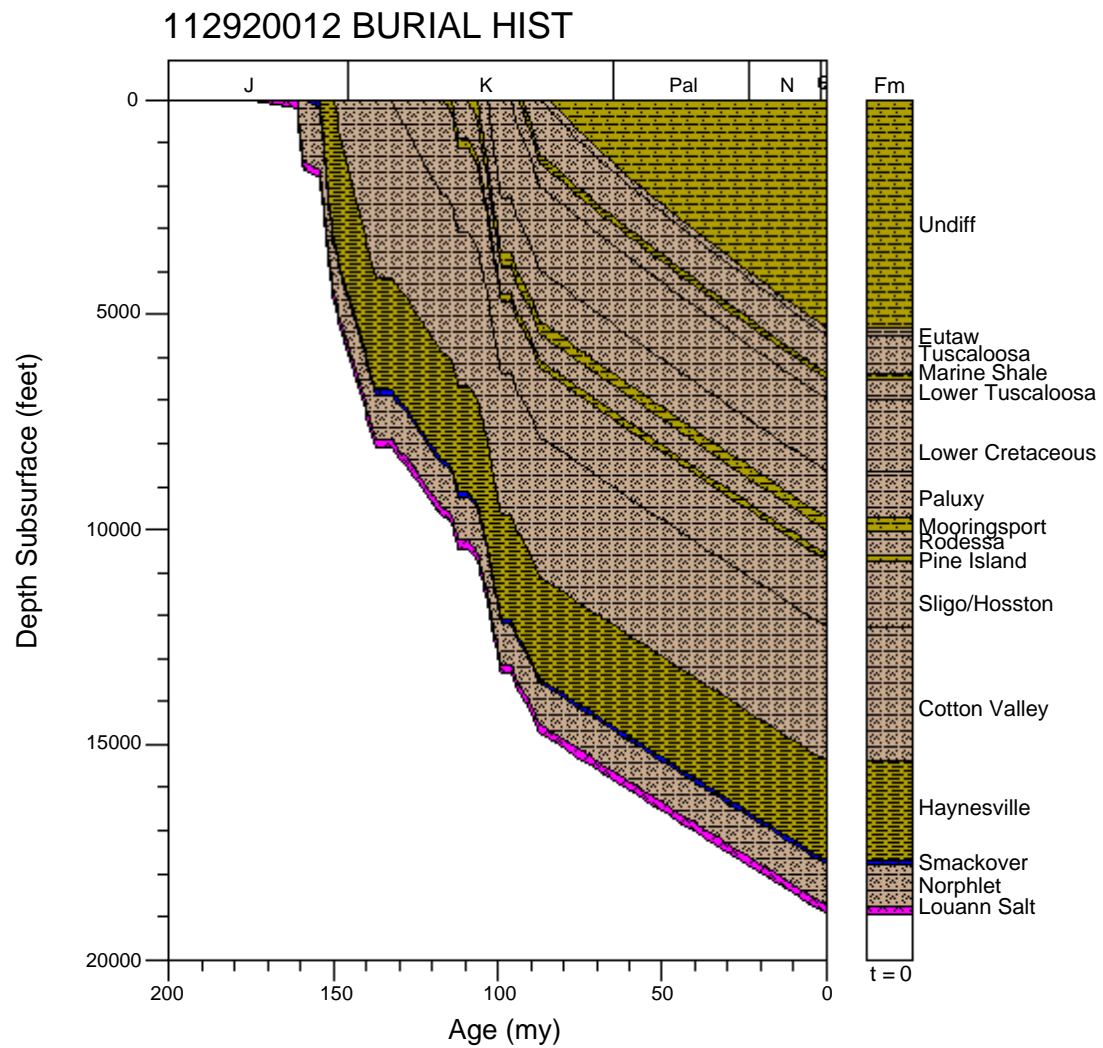


Figure 7. Burial history for well 112920012, Mississippi Interior Salt Basin.



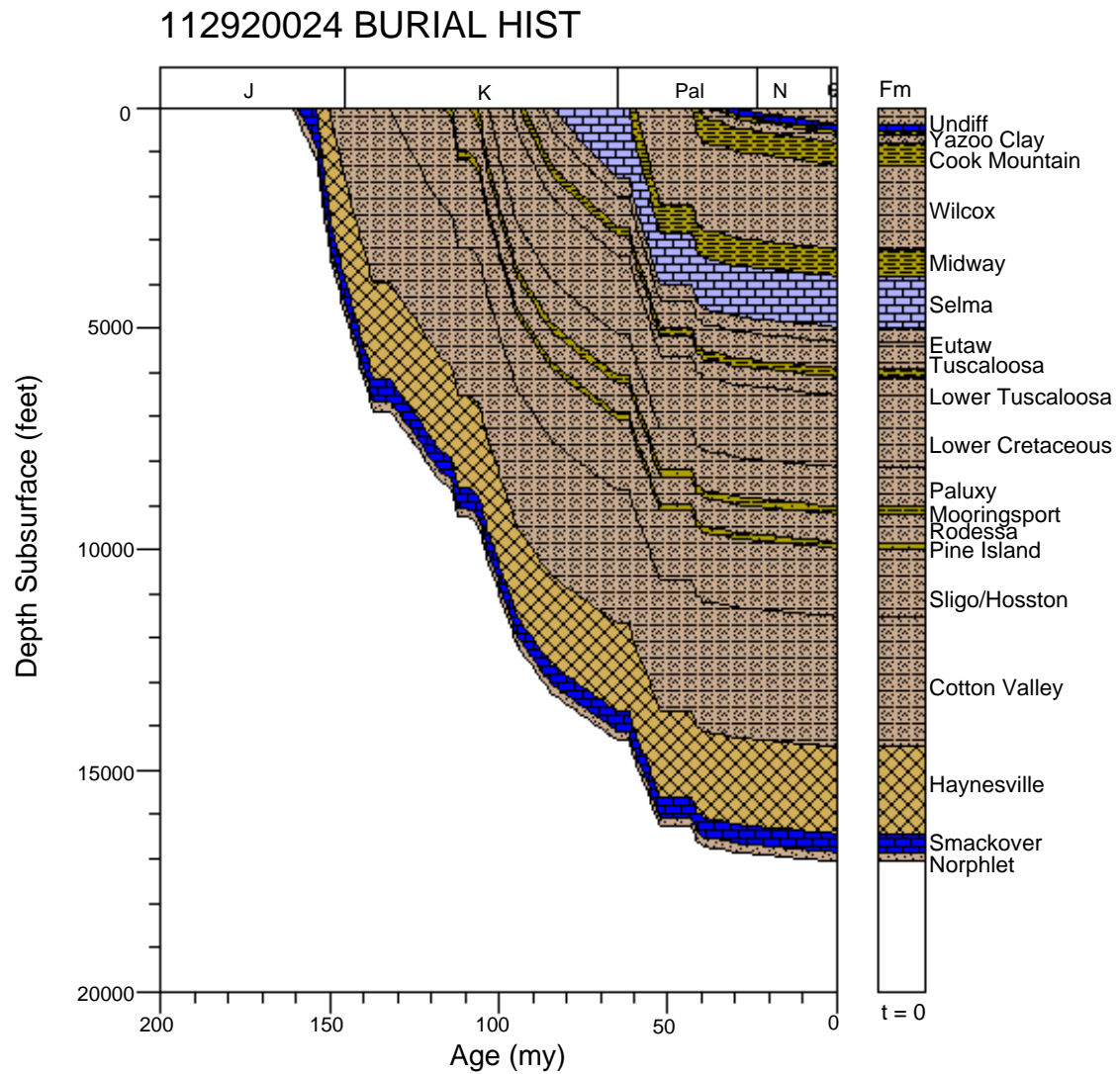


Figure 8. Burial history for well 112920024, Mississippi Interior Salt Basin.



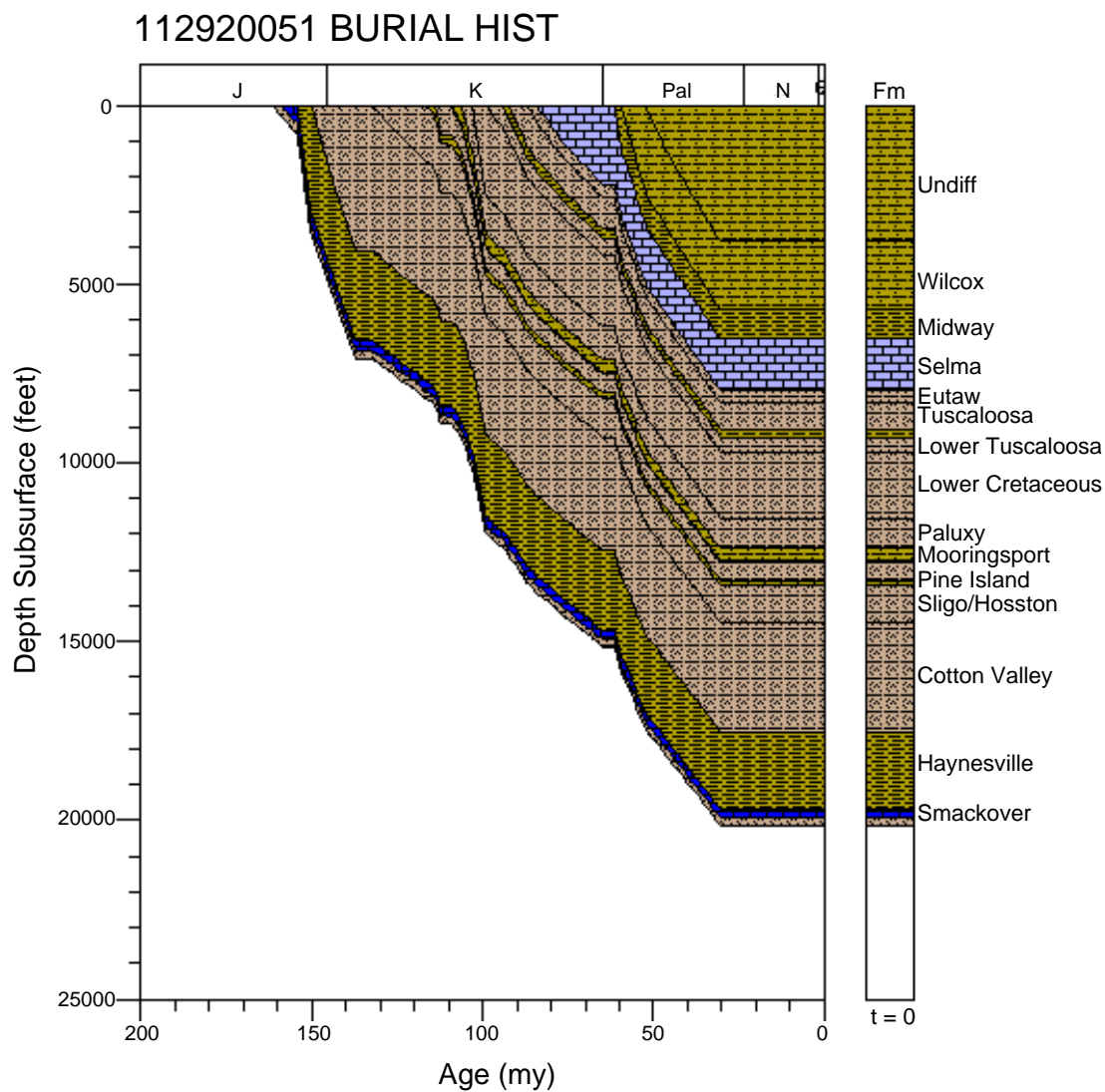


Figure 9. Burial history for well 112920051, Mississippi Interior Salt Basin.

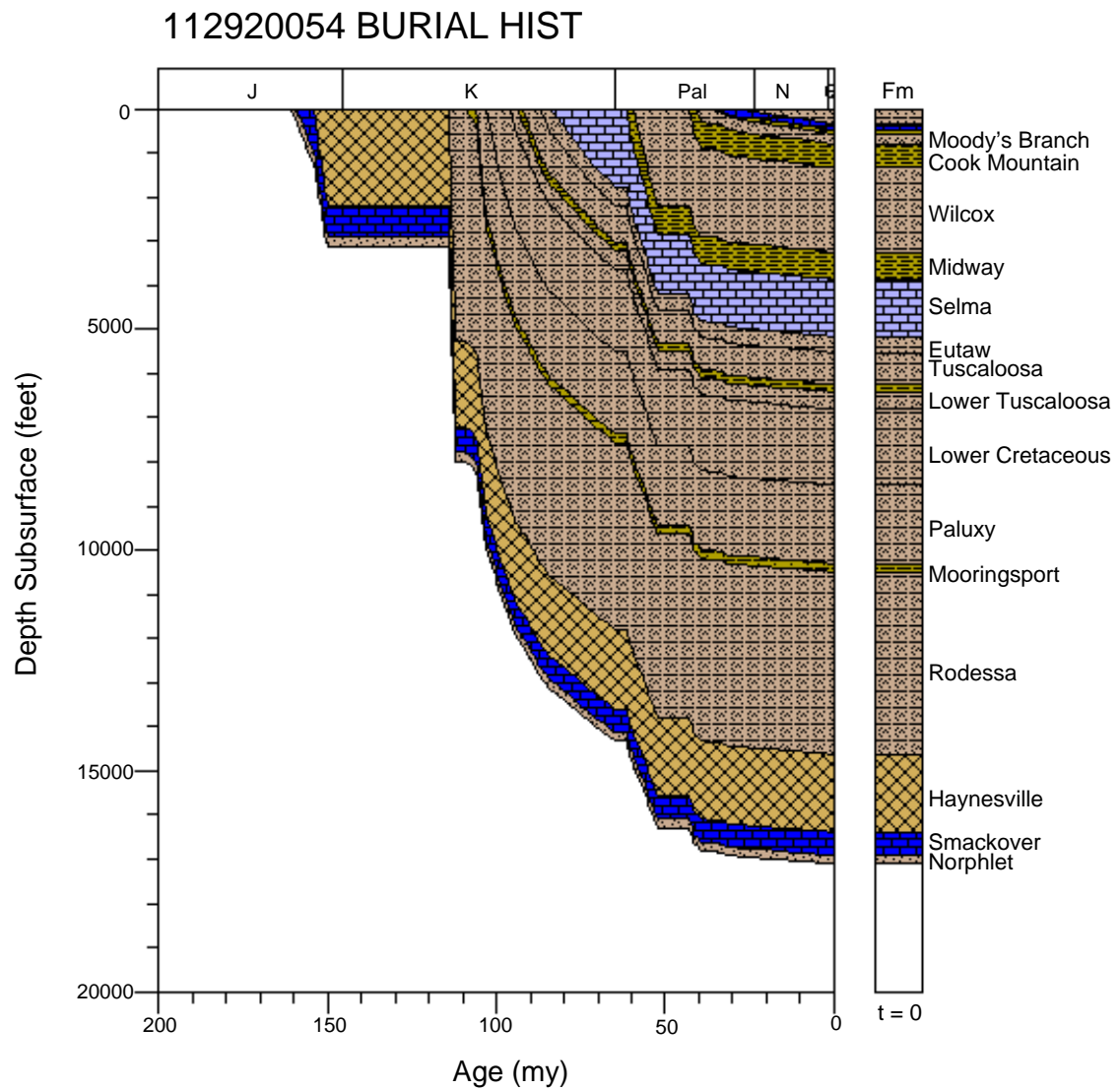


Figure 10. Burial history for well 112920054, Mississippi Interior Salt Basin.

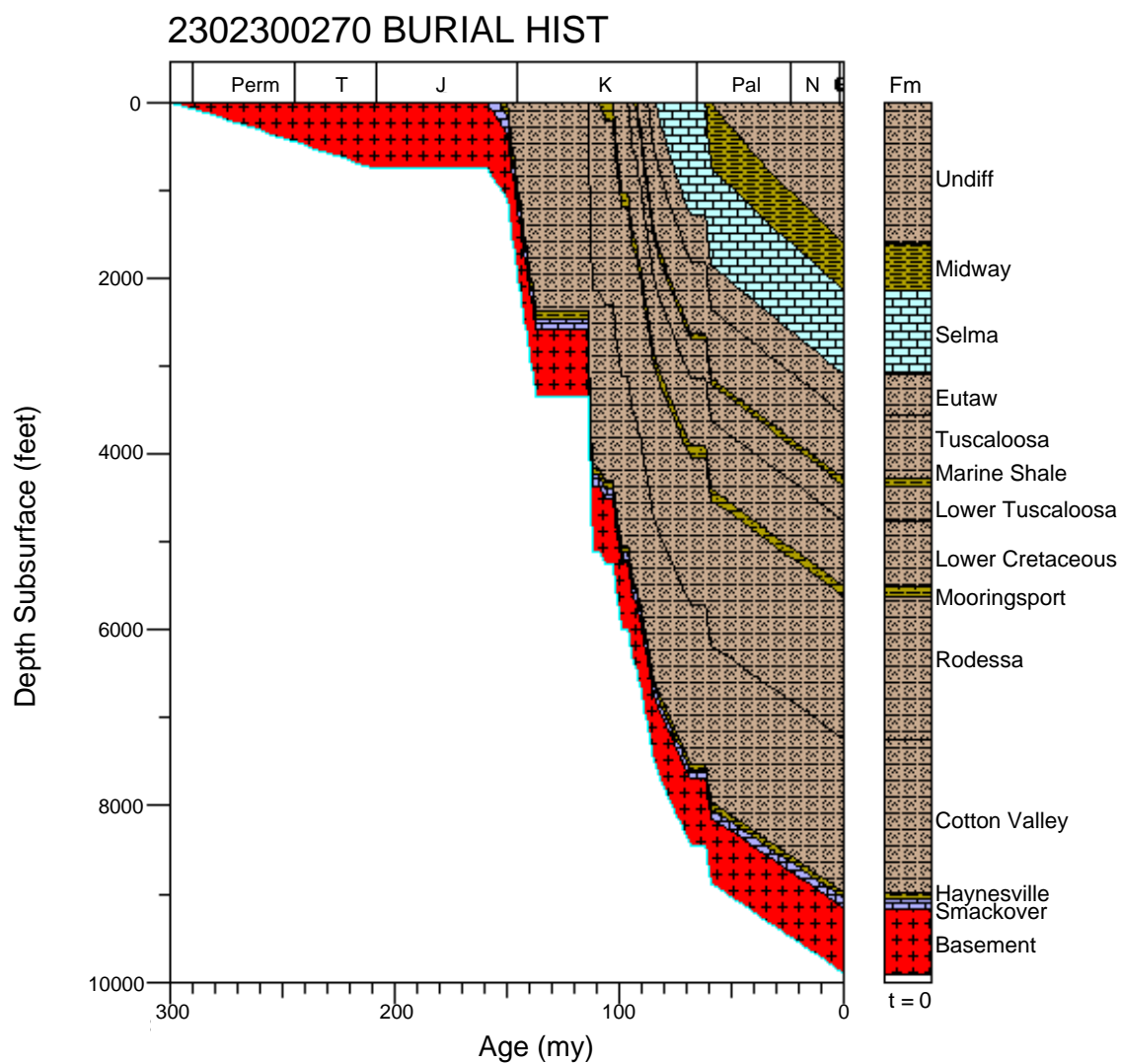


Figure 11. Burial history for well 2302300270, Mississippi Interior Salt Basin.

# 2302320114 BURIAL HIST

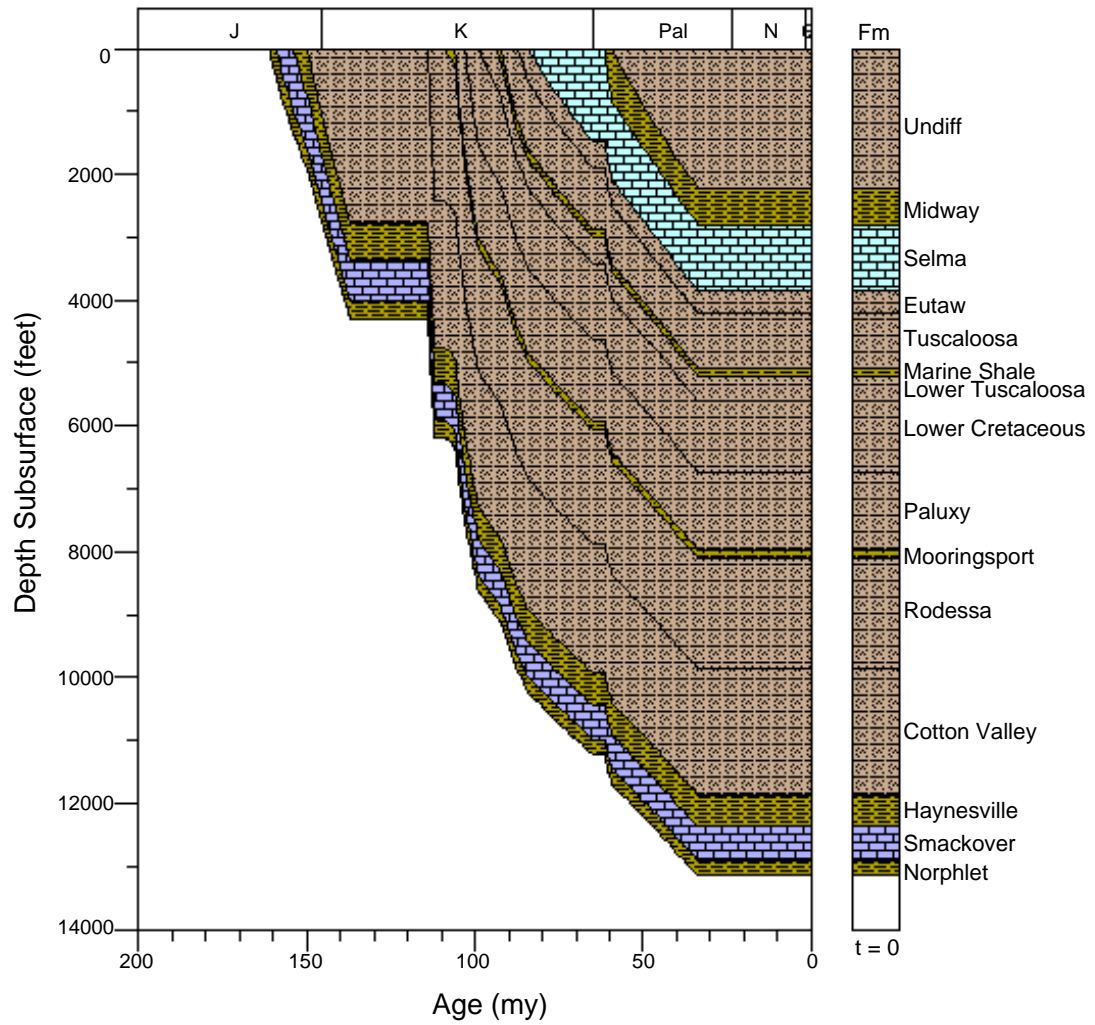


Figure 12. Burial history for well 2302320114, Mississippi Interior Salt Basin.

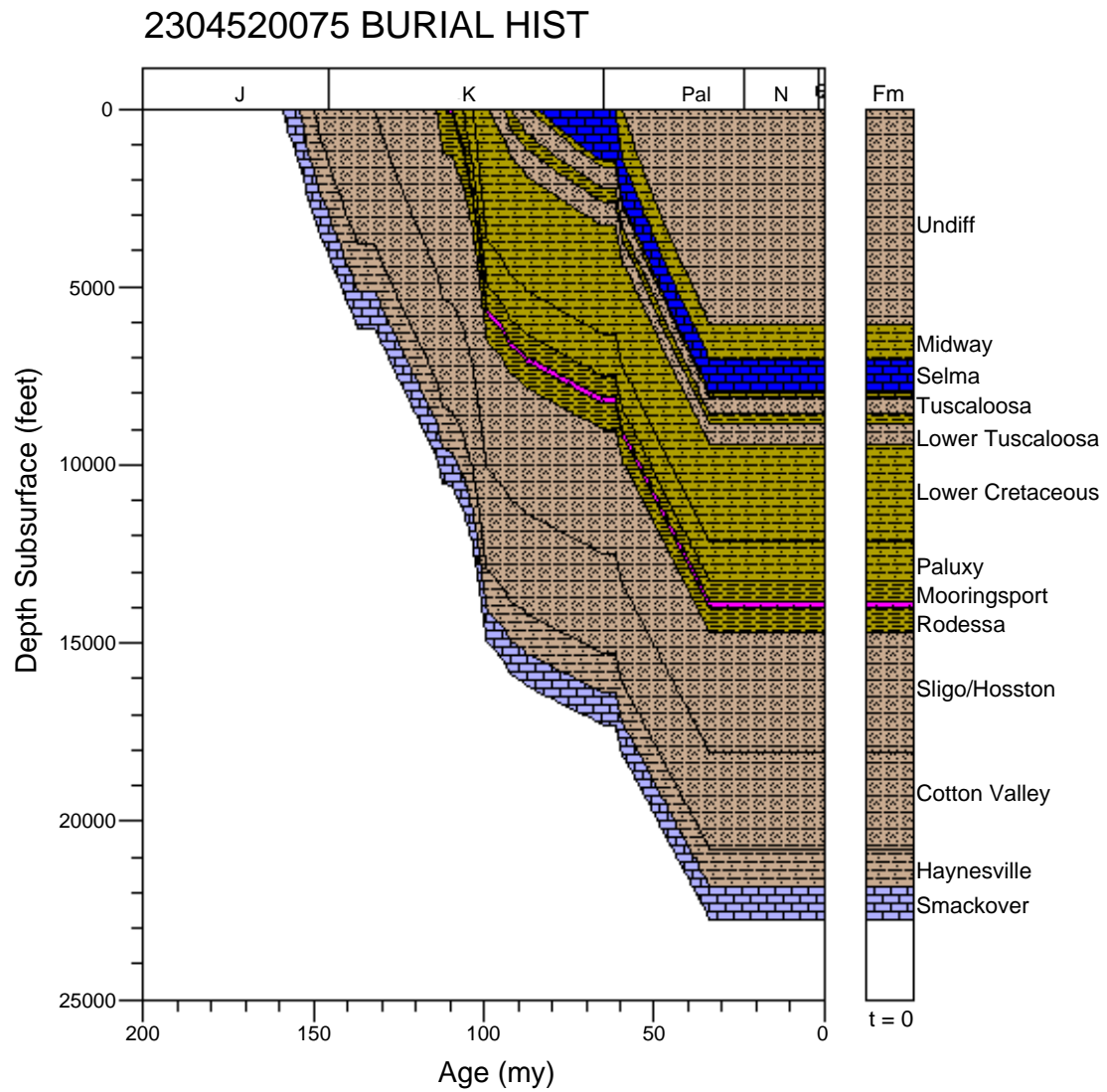


Figure 13. Burial history for well 2304520075, Mississippi Interior Salt Basin.

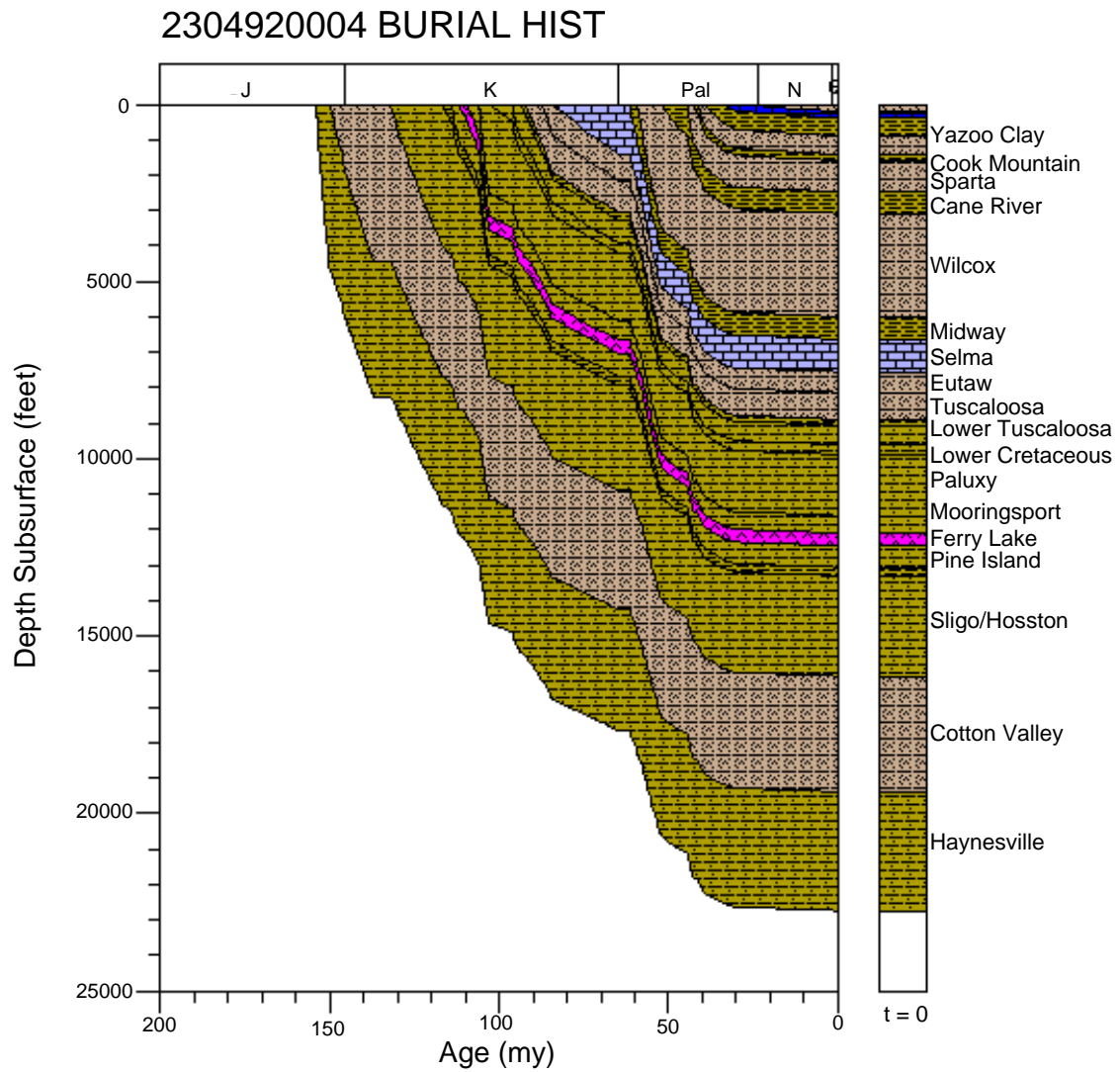


Figure 14. Burial history for well 2304920004, Mississippi Interior Salt Basin.

# 2304920005 BURIAL HIST

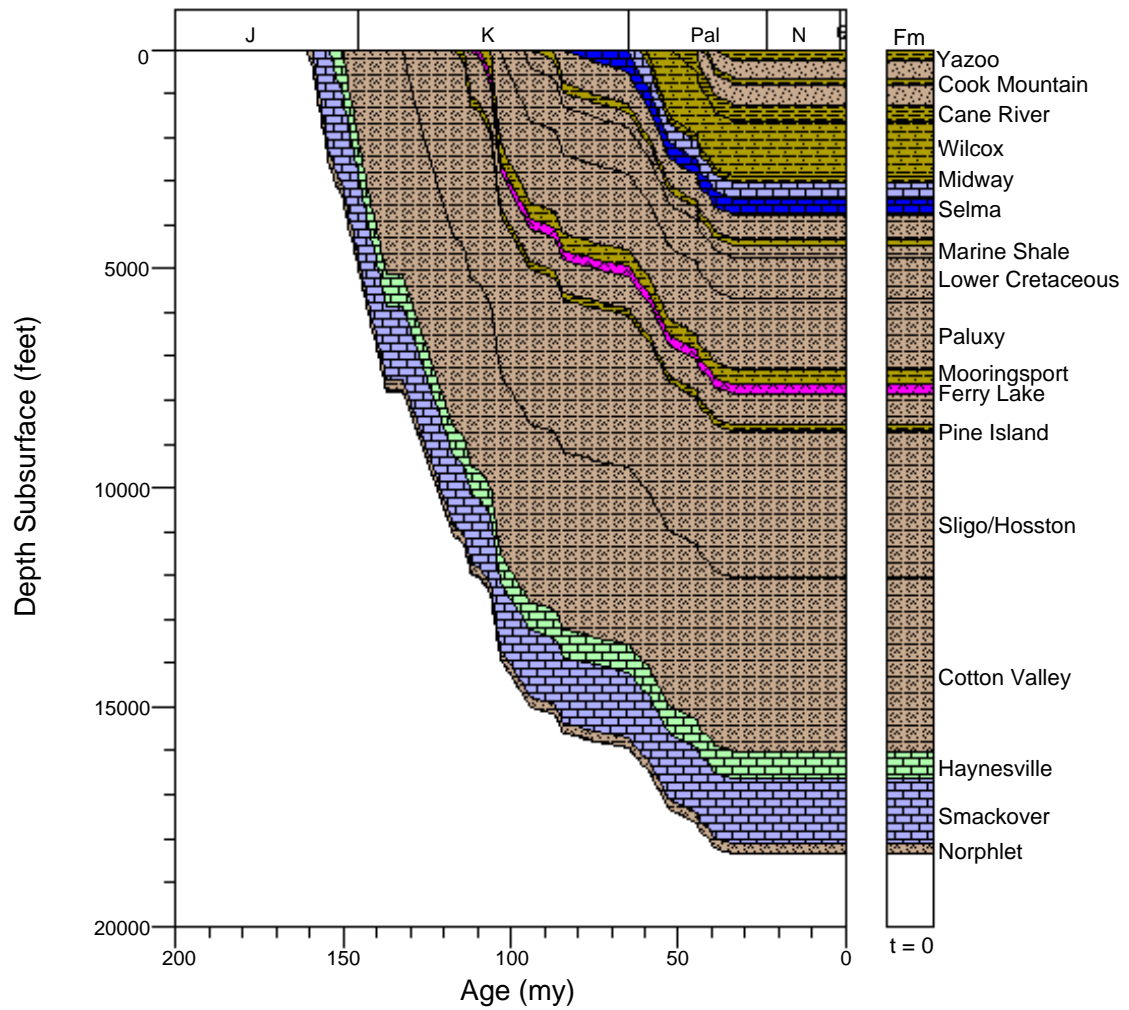


Figure 15. Burial history for well 2304920005, Mississippi Interior Salt Basin.



# 2304920011 BURIAL HIST

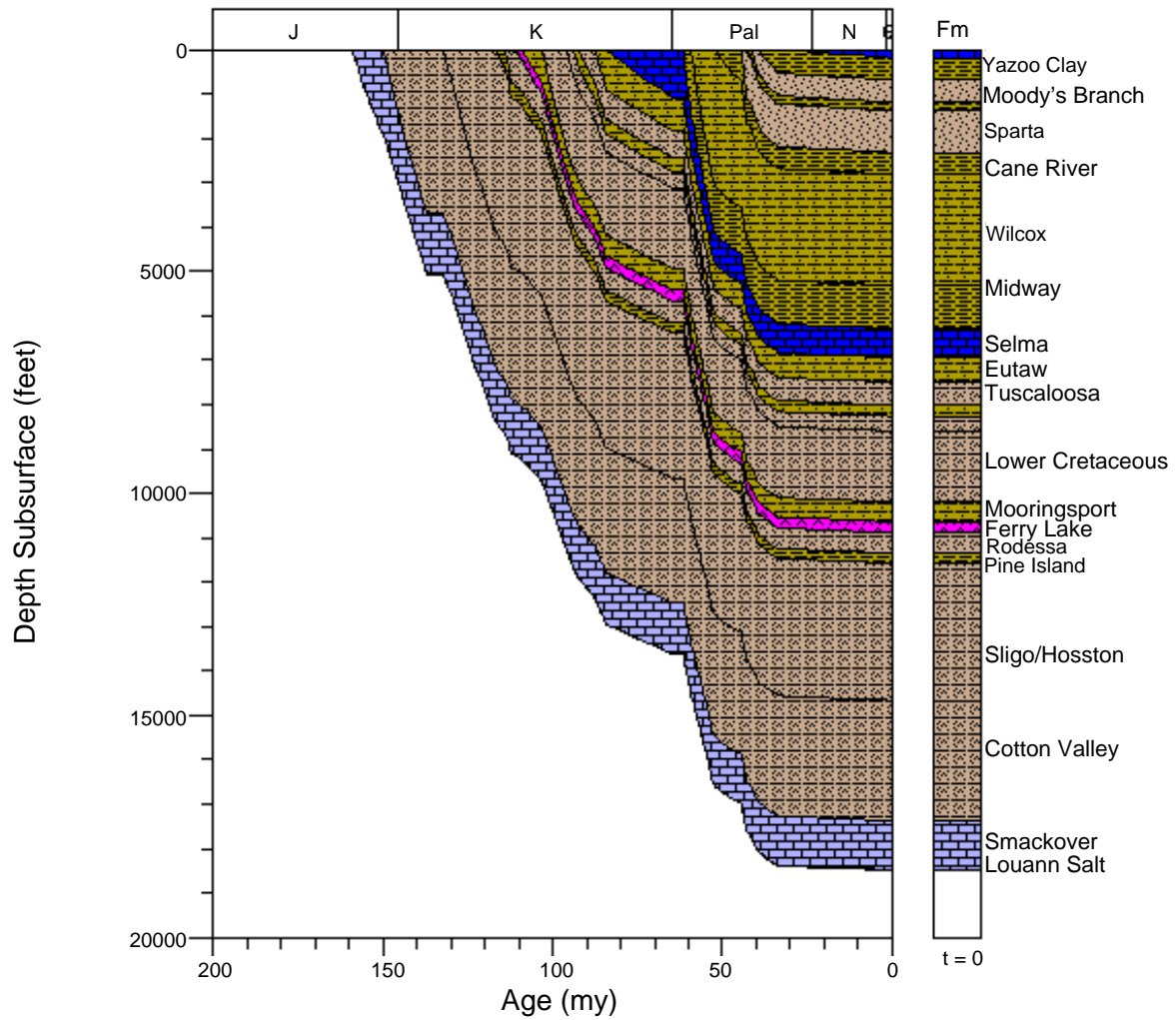


Figure 16. Burial history for well 2304920011, Mississippi Interior Salt Basin.



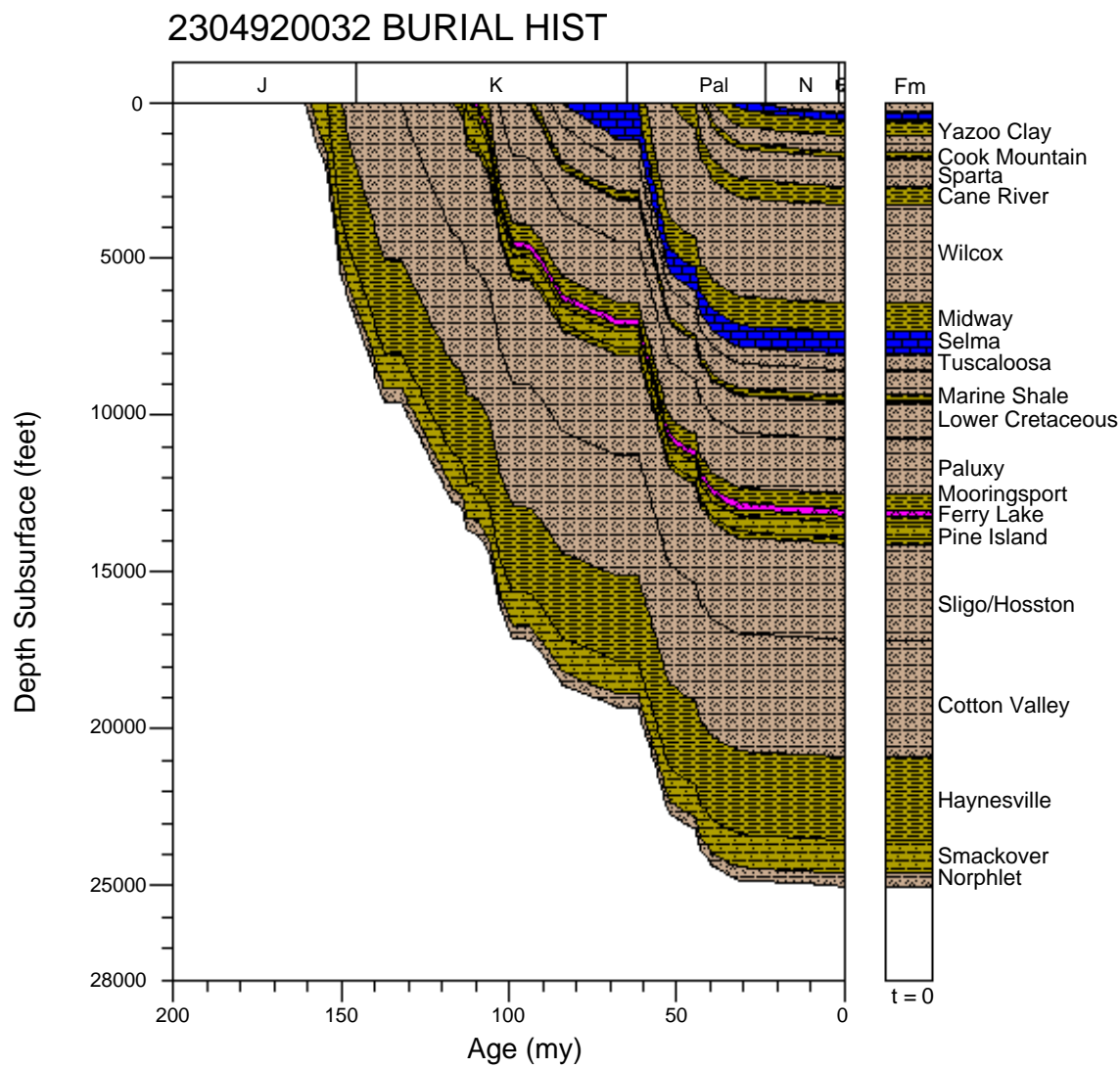


Figure 17. Burial history for well 2304920032, Mississippi Interior Salt Basin.

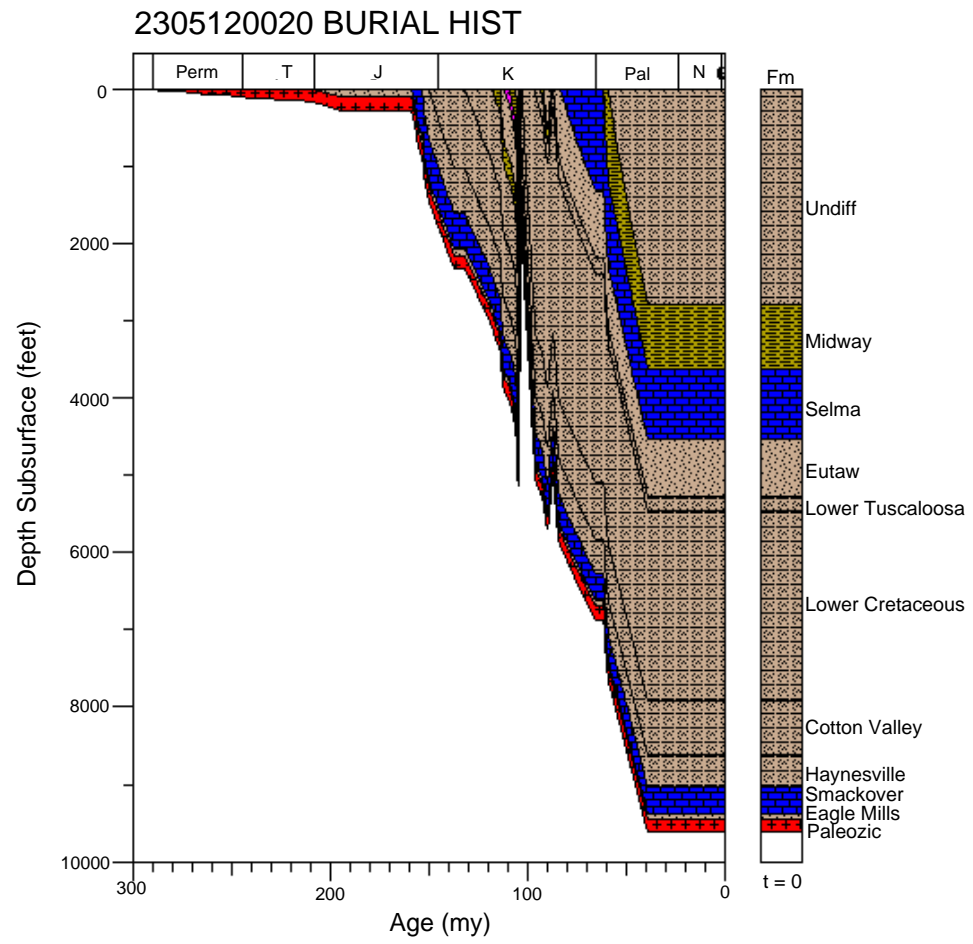


Figure 18. Burial history for well 2305120020, Mississippi Interior Salt Basin.

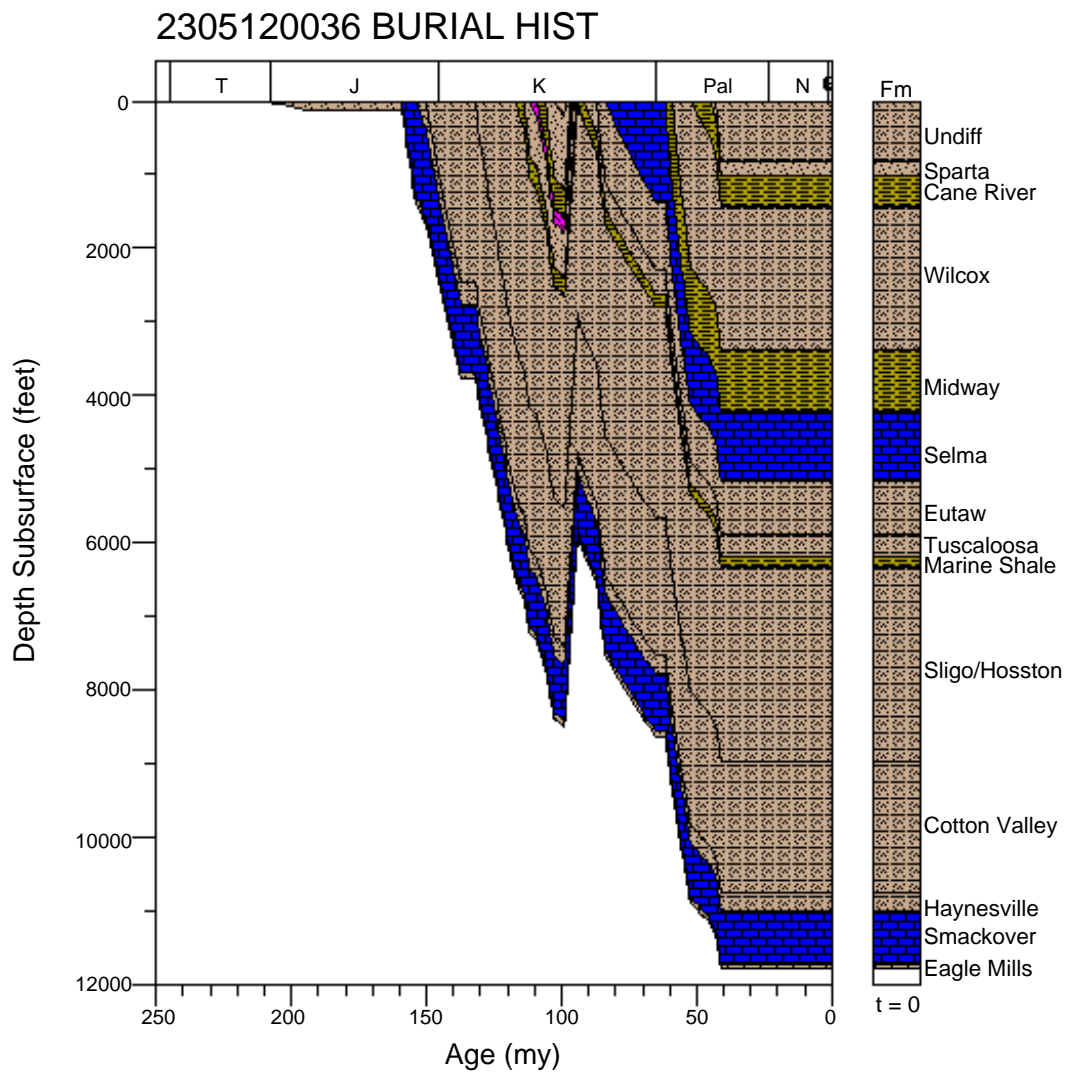


Figure 19. Burial history for well 2305120036, Mississippi Interior Salt Basin.

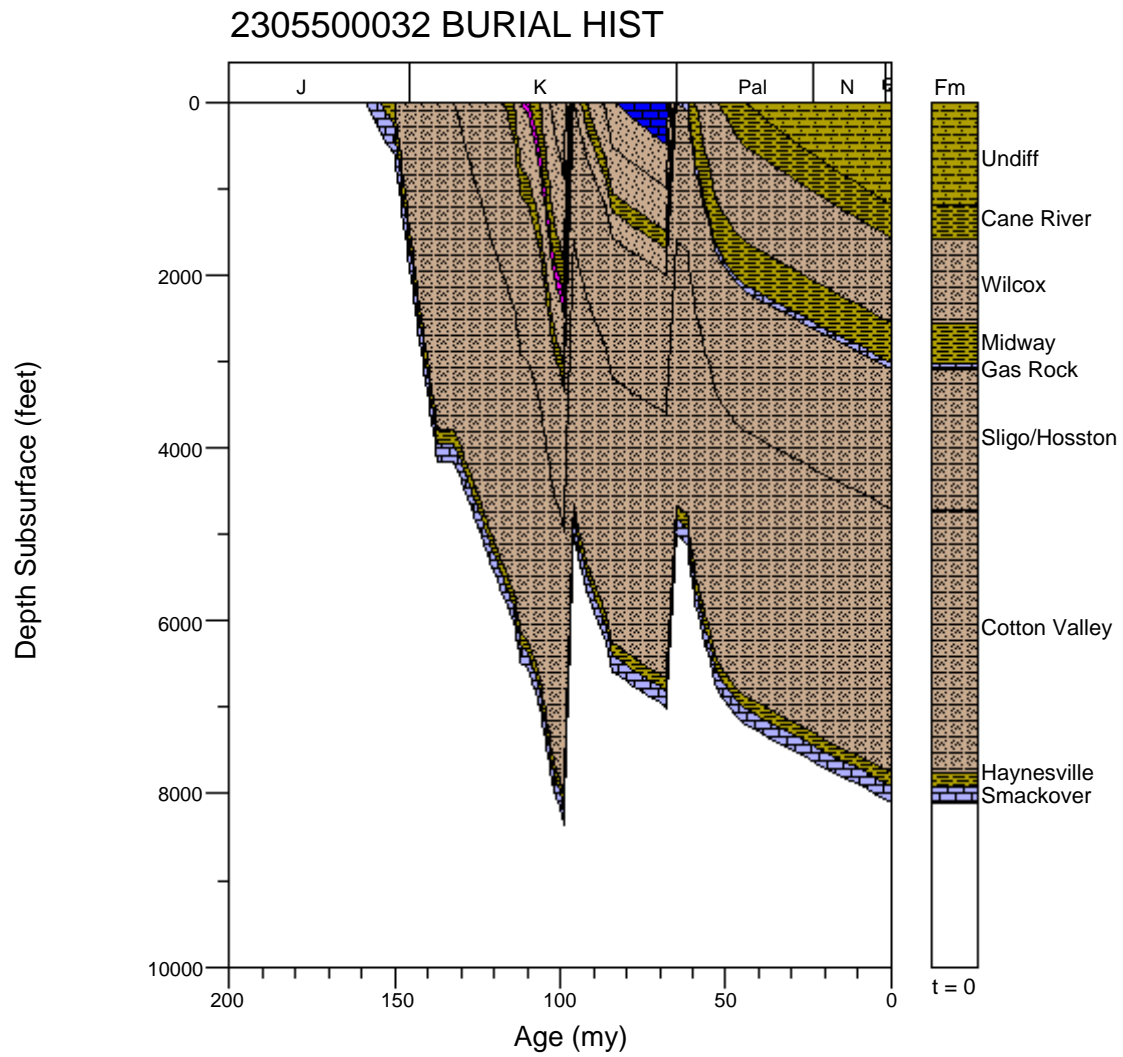


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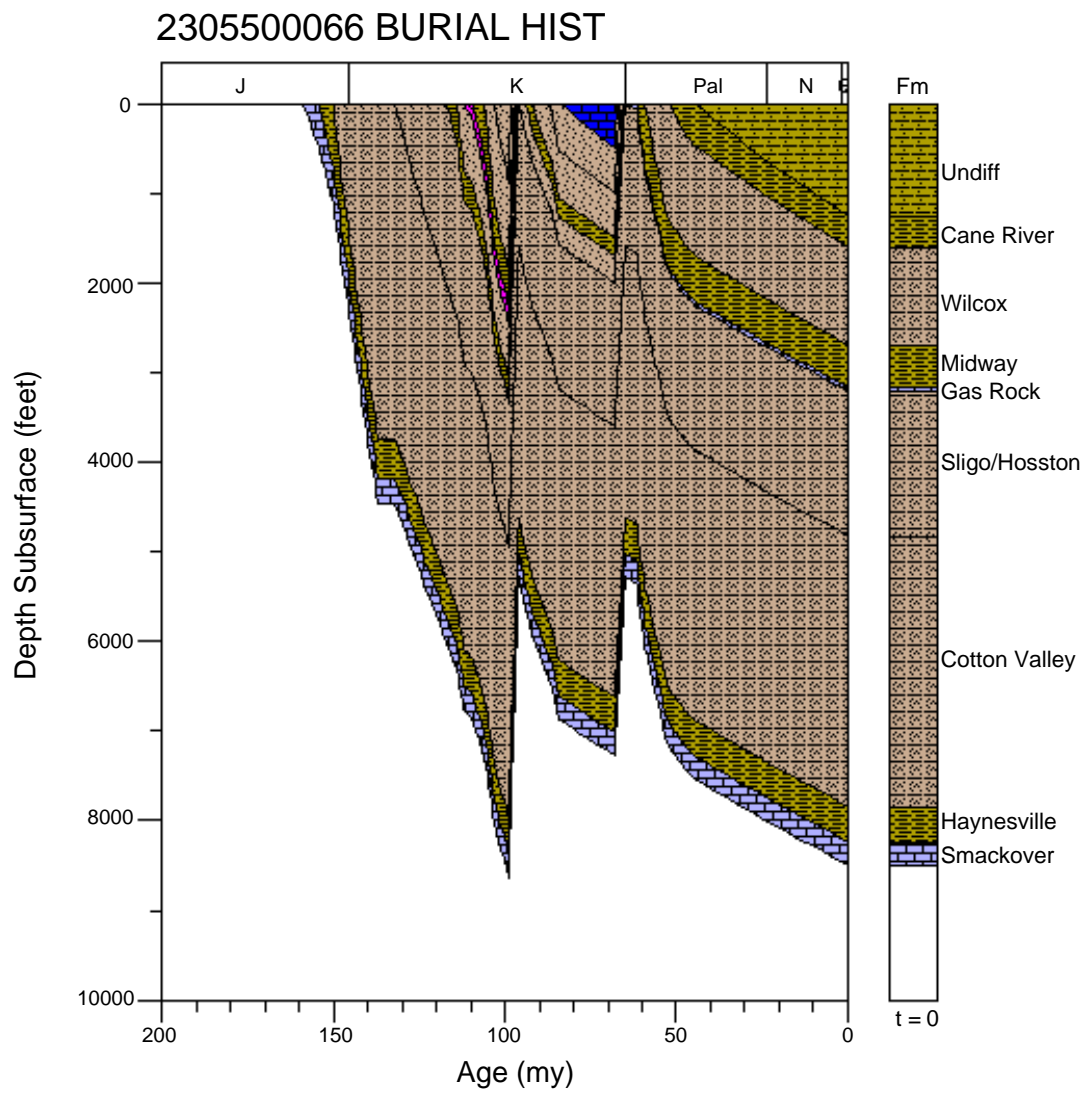


Figure 21. Burial history for well 2305500066, Mississippi Interior Salt Basin.

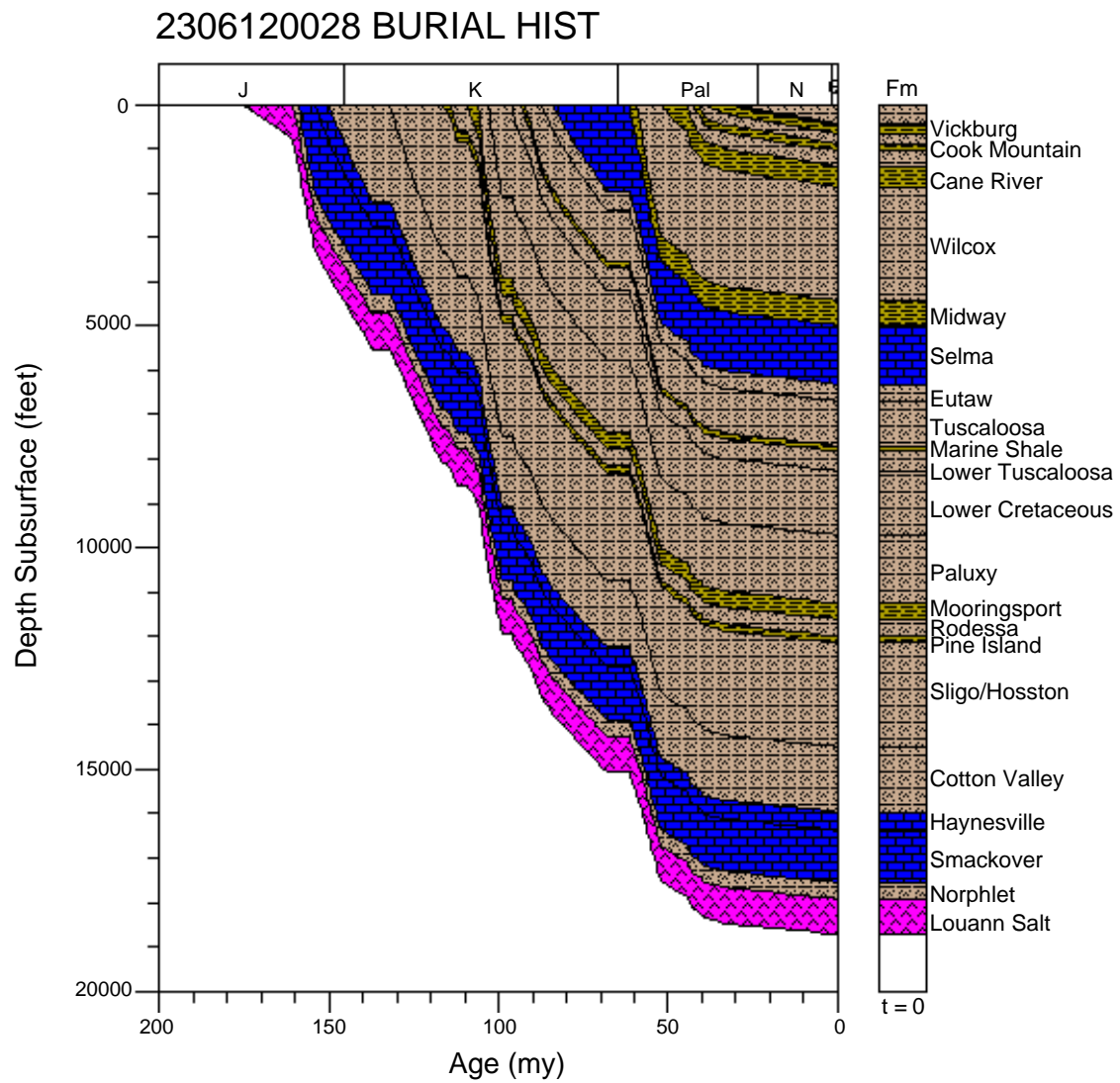


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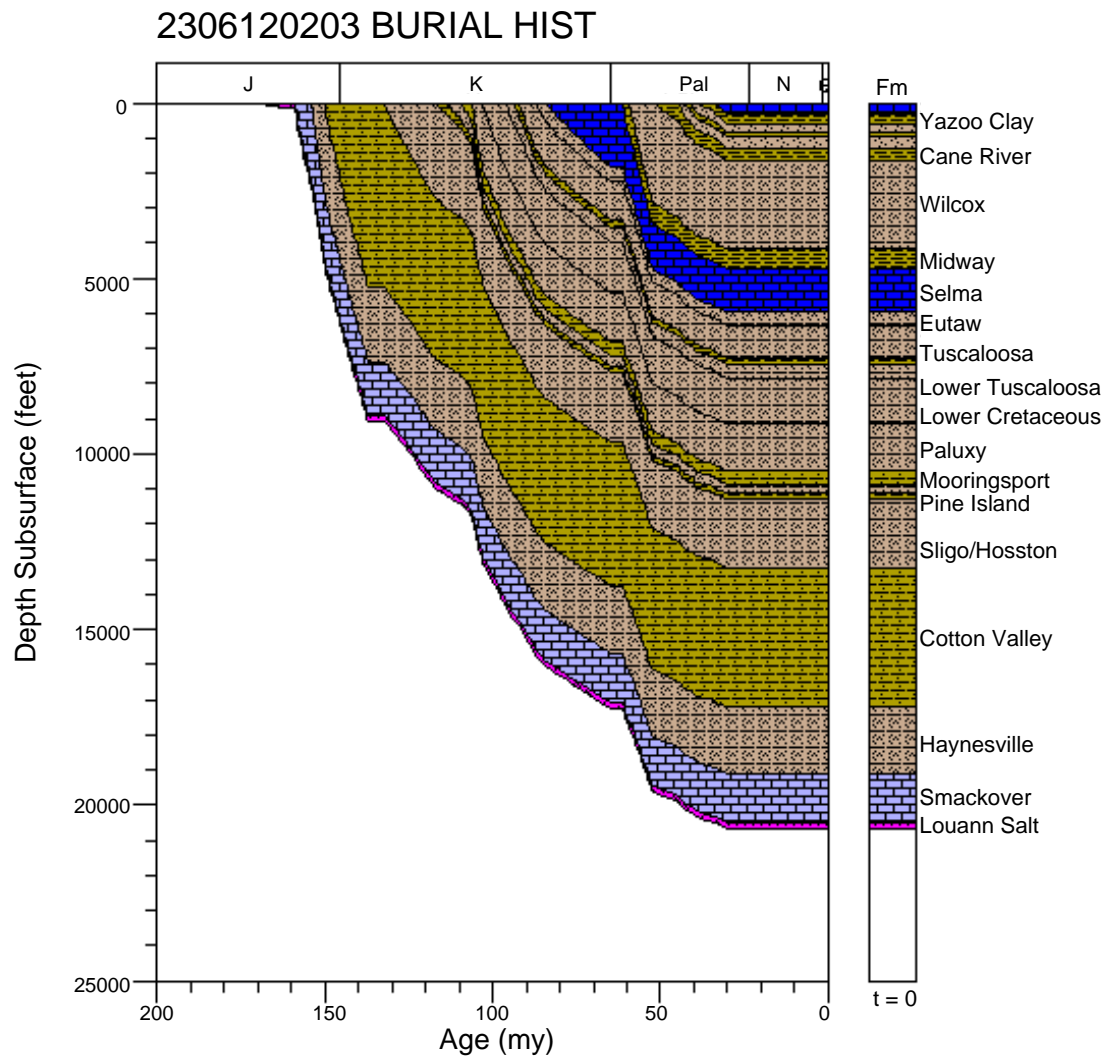


Figure 23. Burial history for well 2306120203, Mississippi Interior Salt Basin.



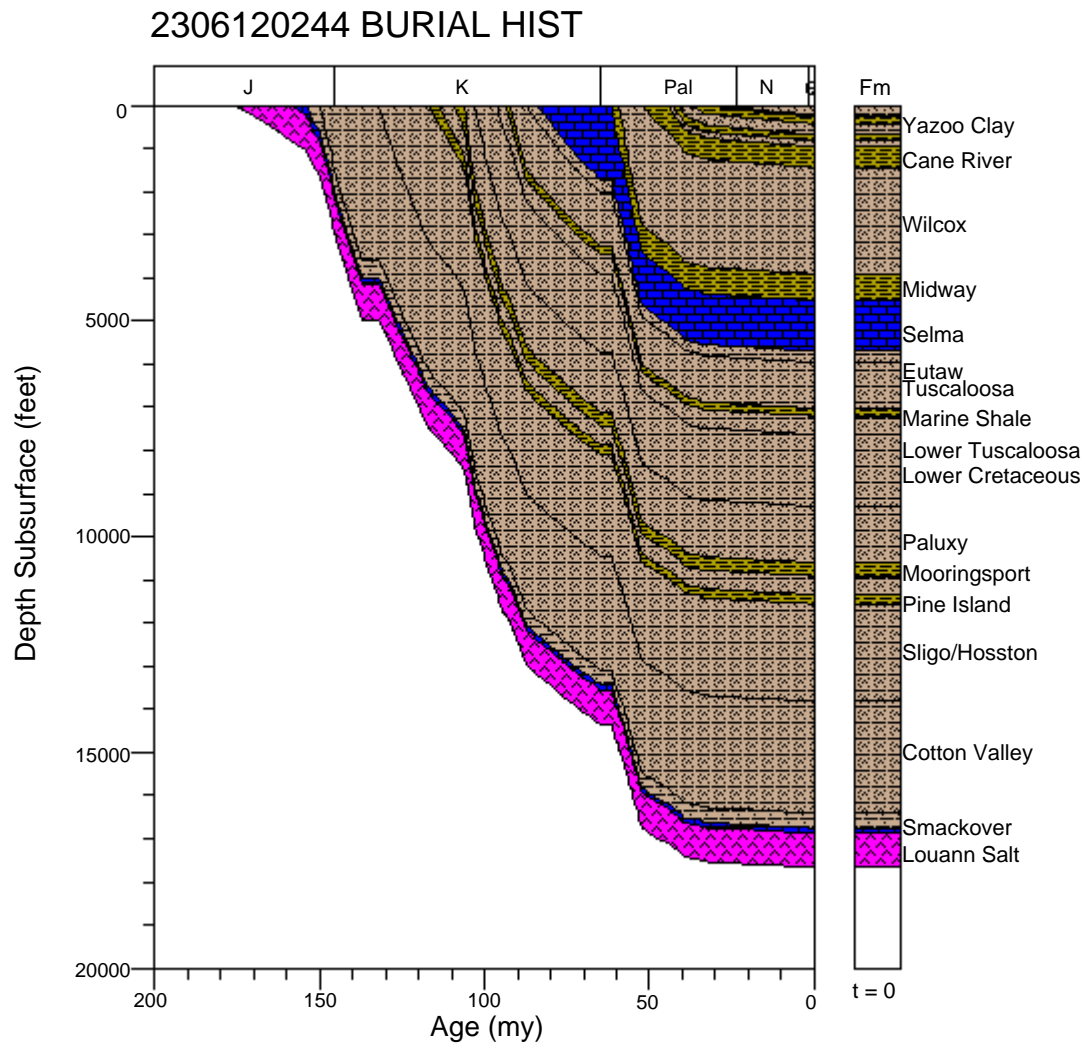


Figure 24. Burial history for well 2306120244, Mississippi Interior Salt Basin.



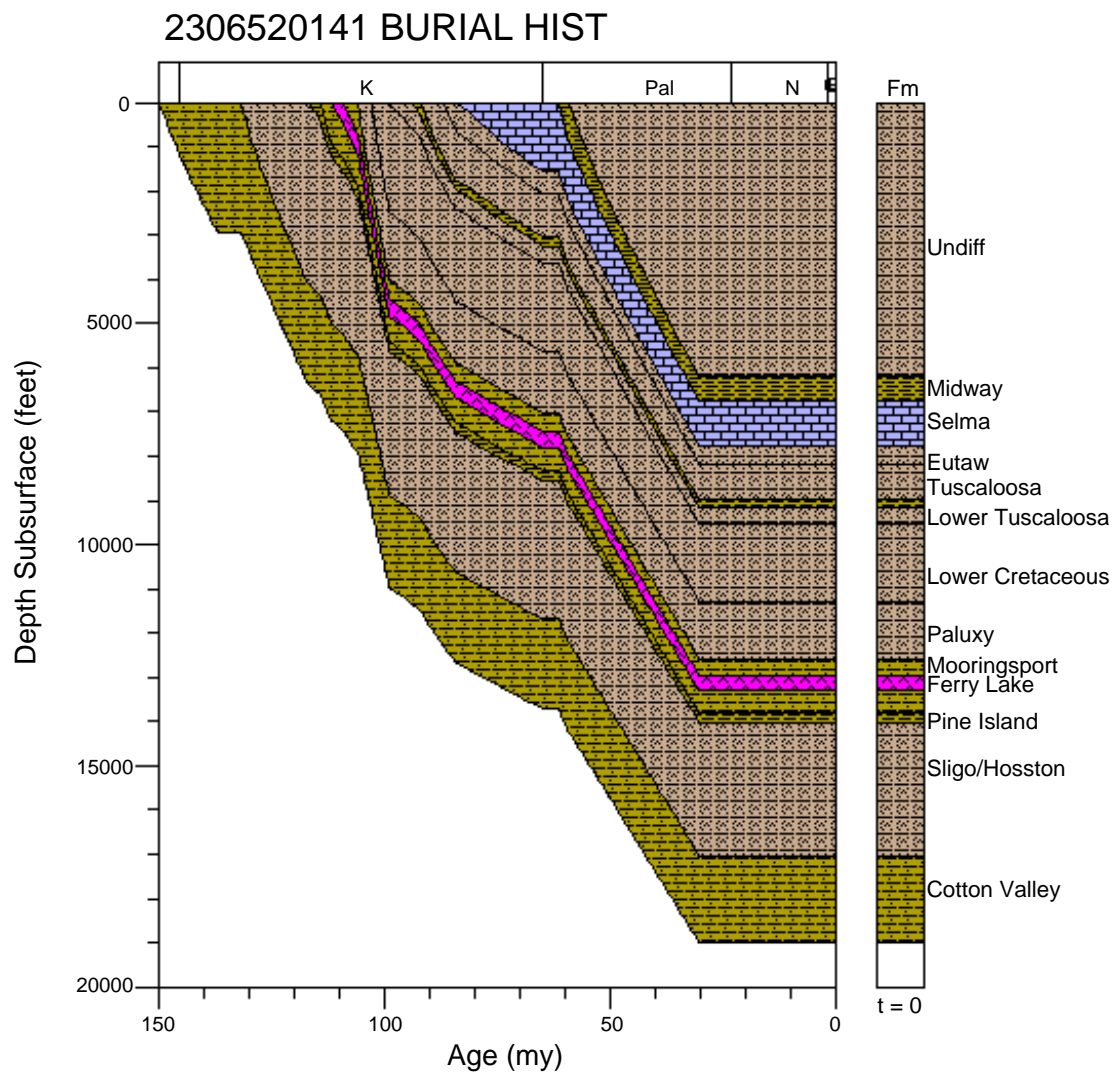


Figure 25. Burial history for well 2306520141, Mississippi Interior Salt Basin.

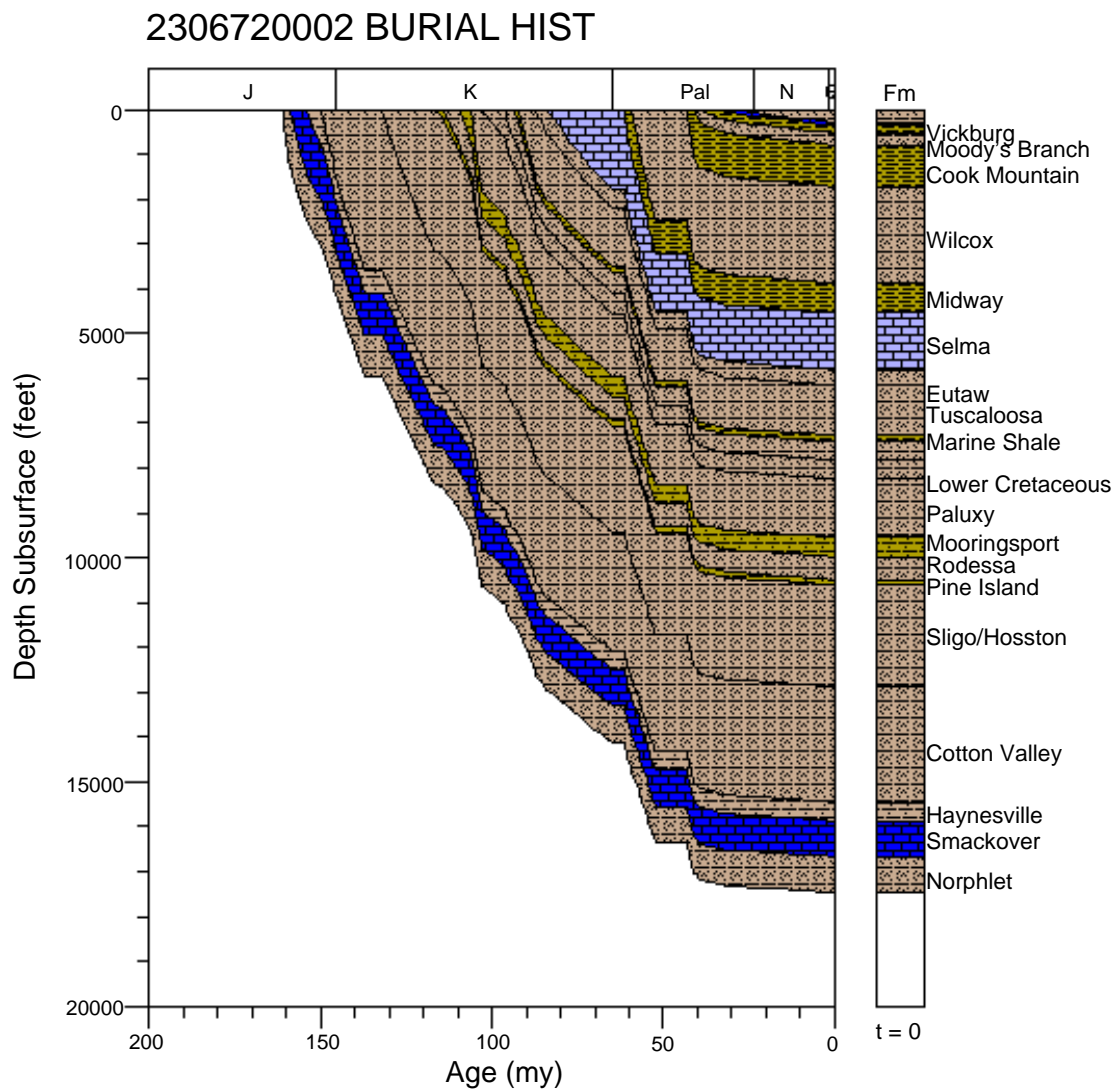


Figure 26. Burial history for well 2306720002, Mississippi Interior Salt Basin.

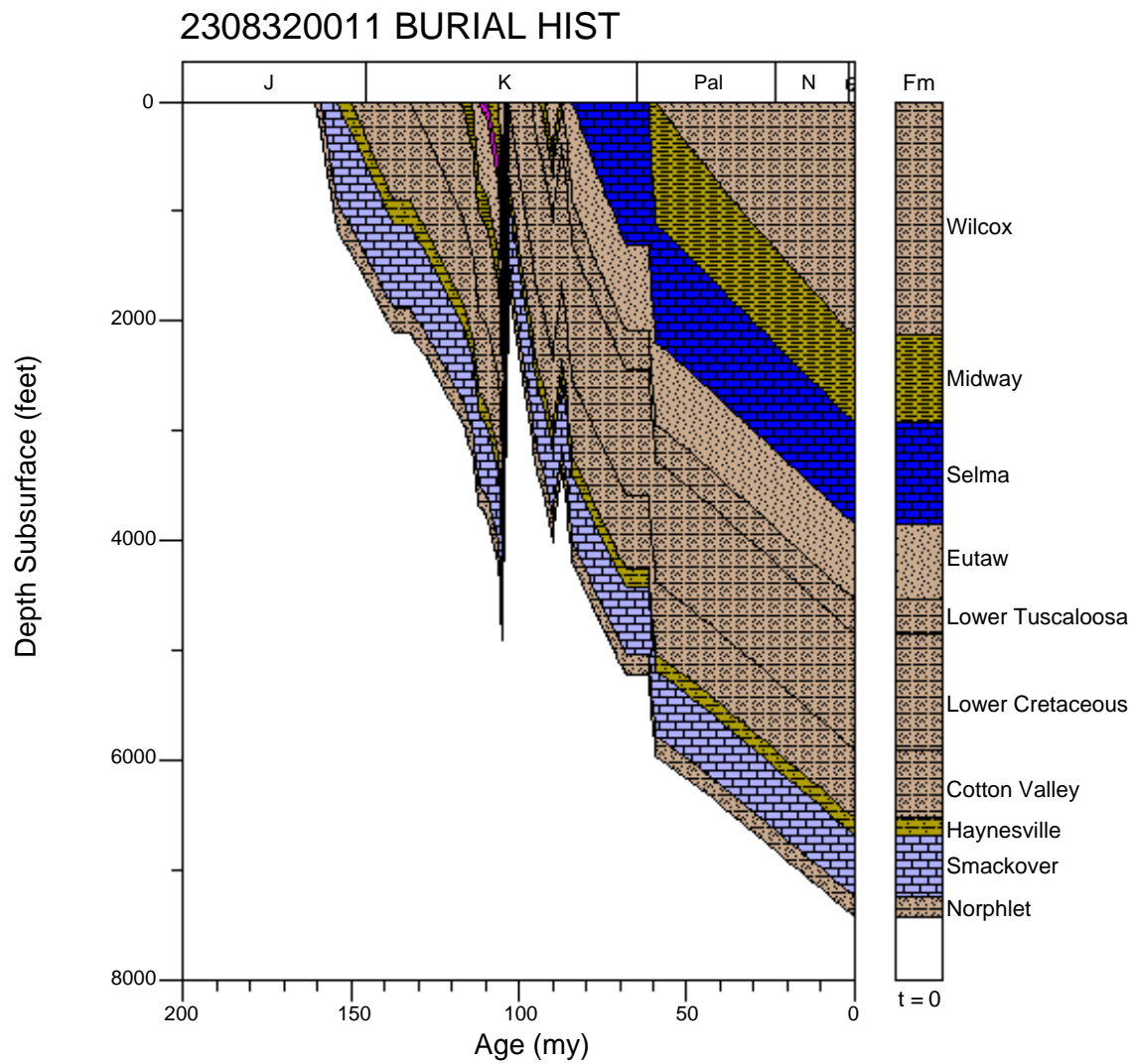


Figure 27. Burial history for well 2308320011, Mississippi Interior Salt Basin.

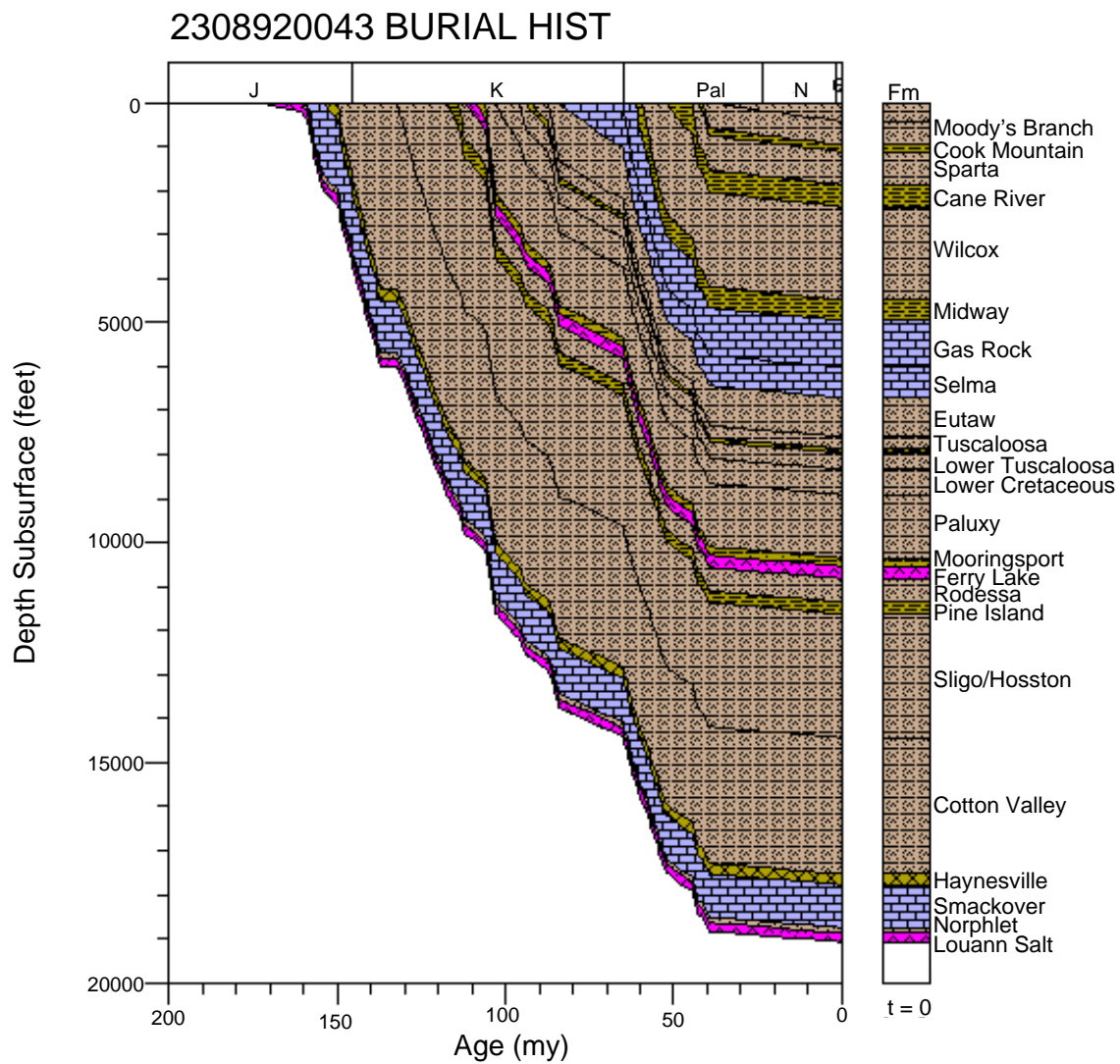


Figure 28. Burial history for well 2308920043, Mississippi Interior Salt Basin.

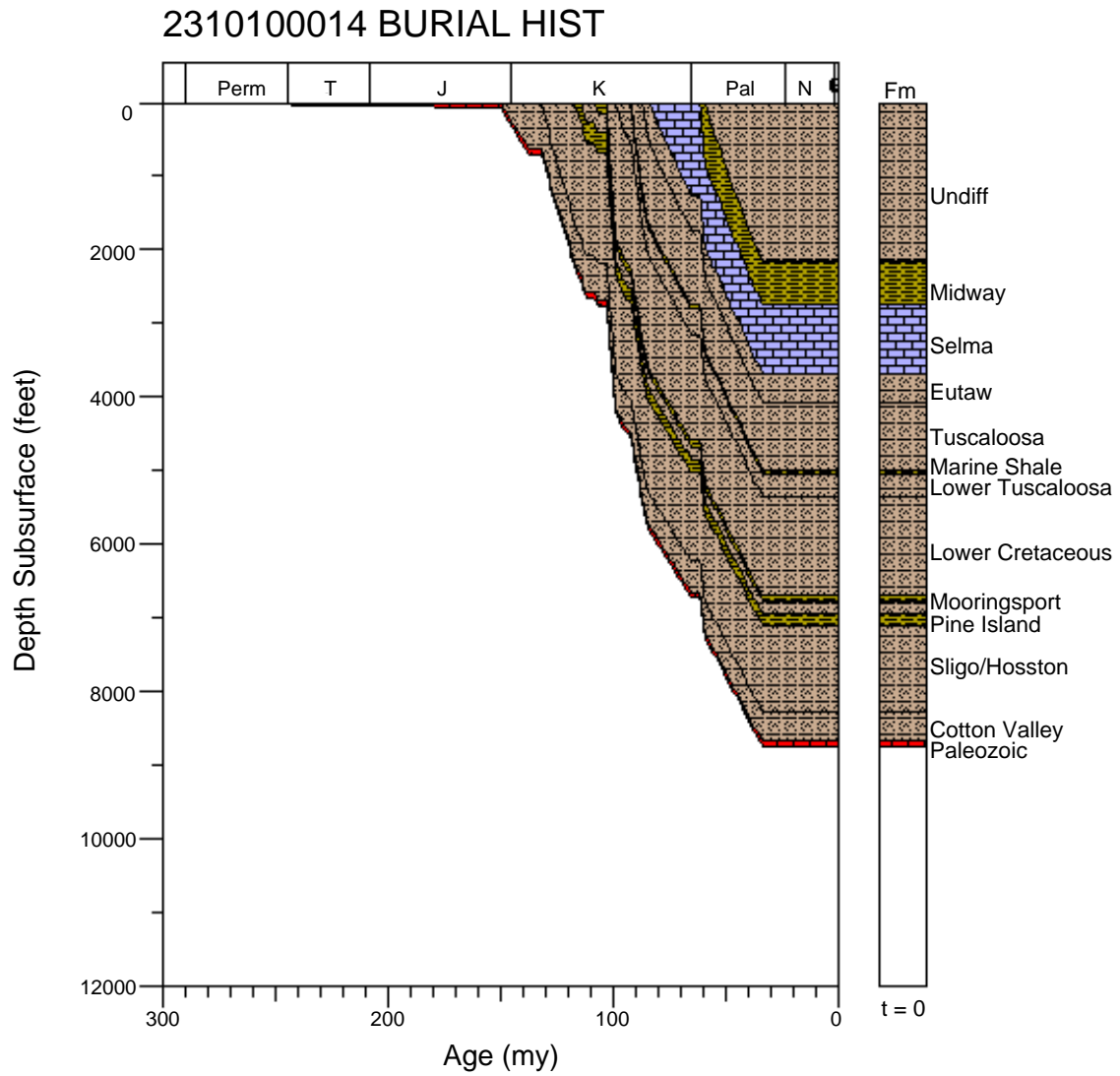


Figure 29. Burial history for well 2310100014, Mississippi Interior Salt Basin.

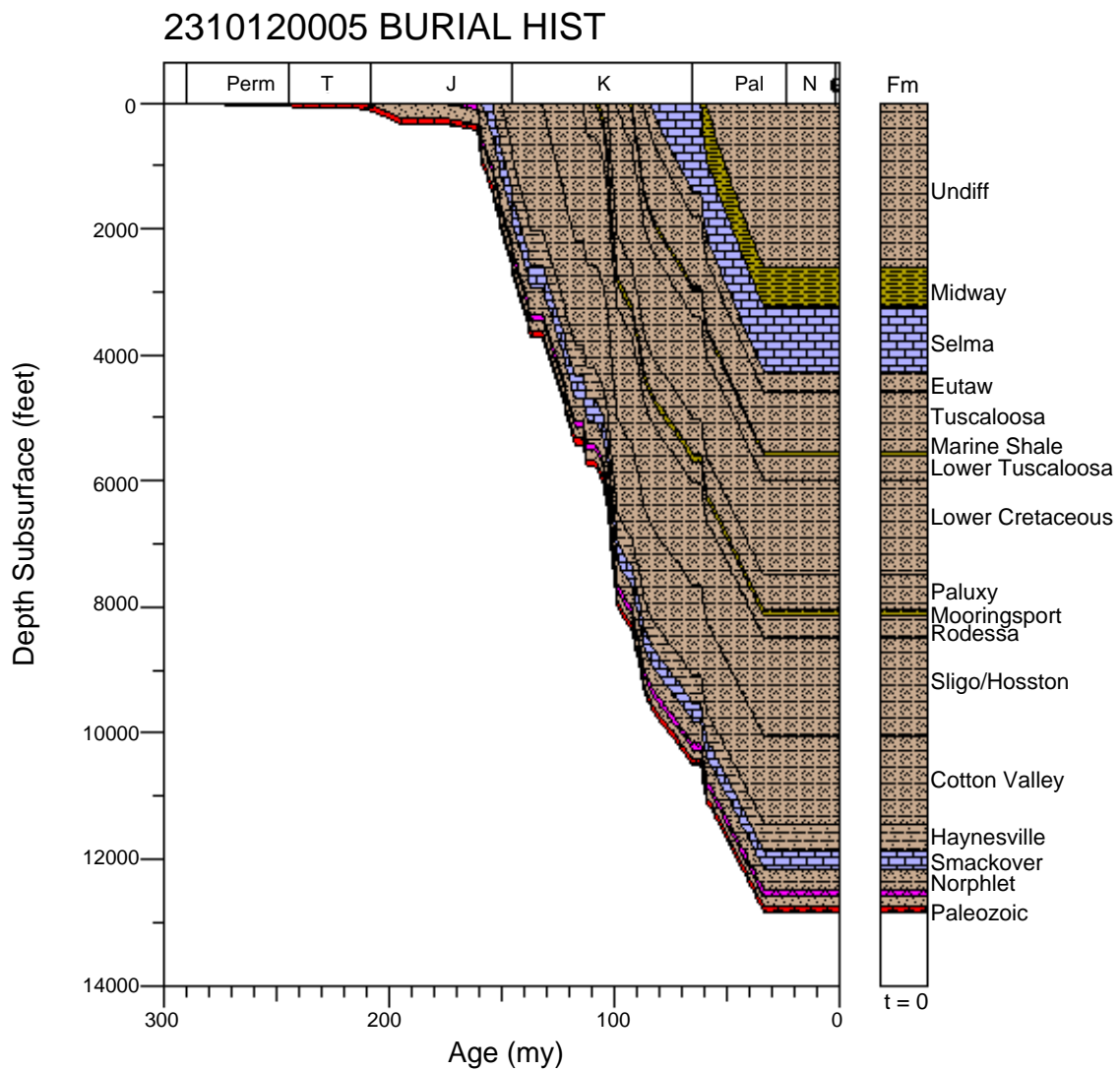


Figure 30. Burial history for well 2310120005, Mississippi Interior Salt Basin.



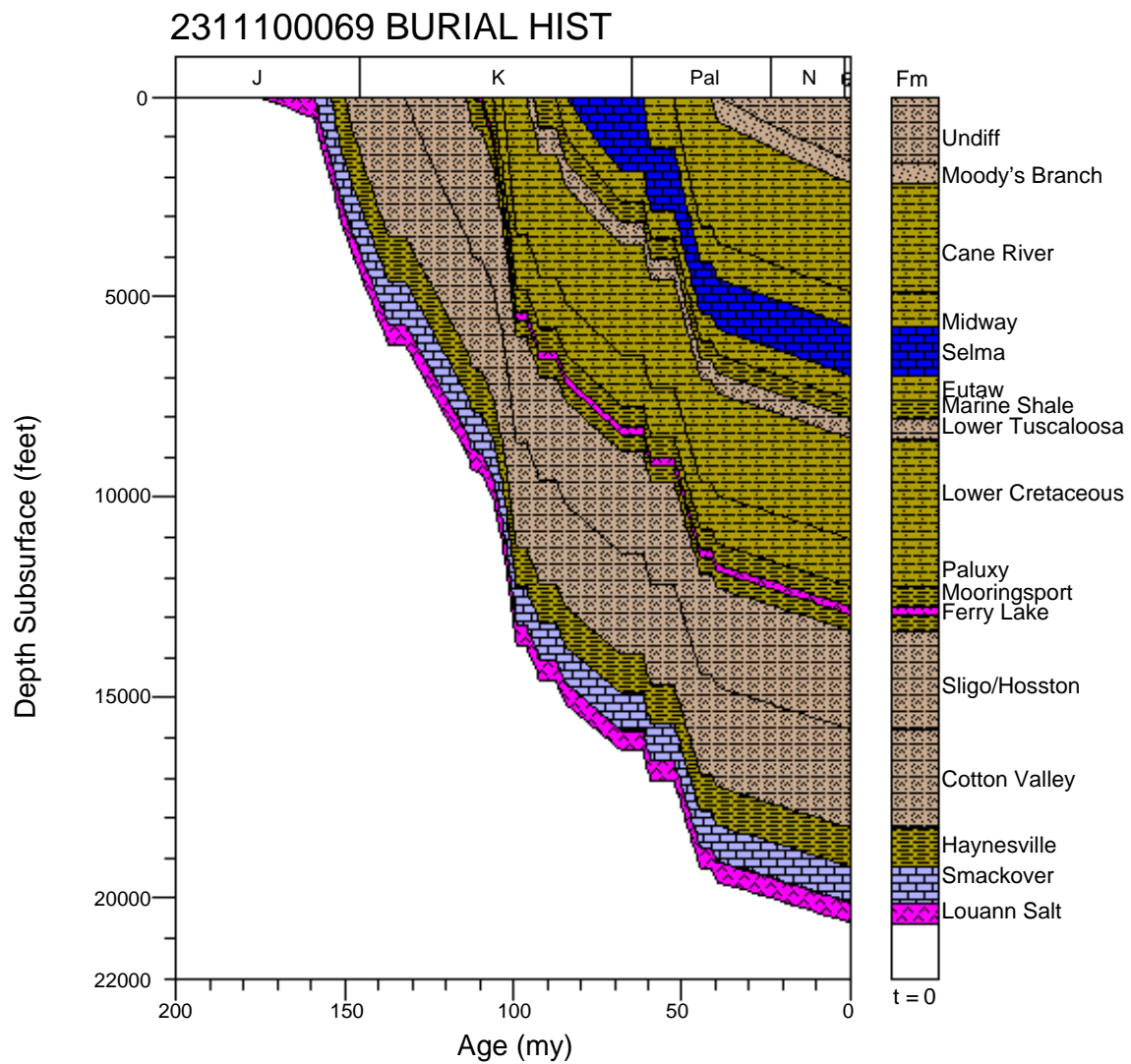


Figure 31. Burial history for well 2311100069, Mississippi Interior Salt Basin.

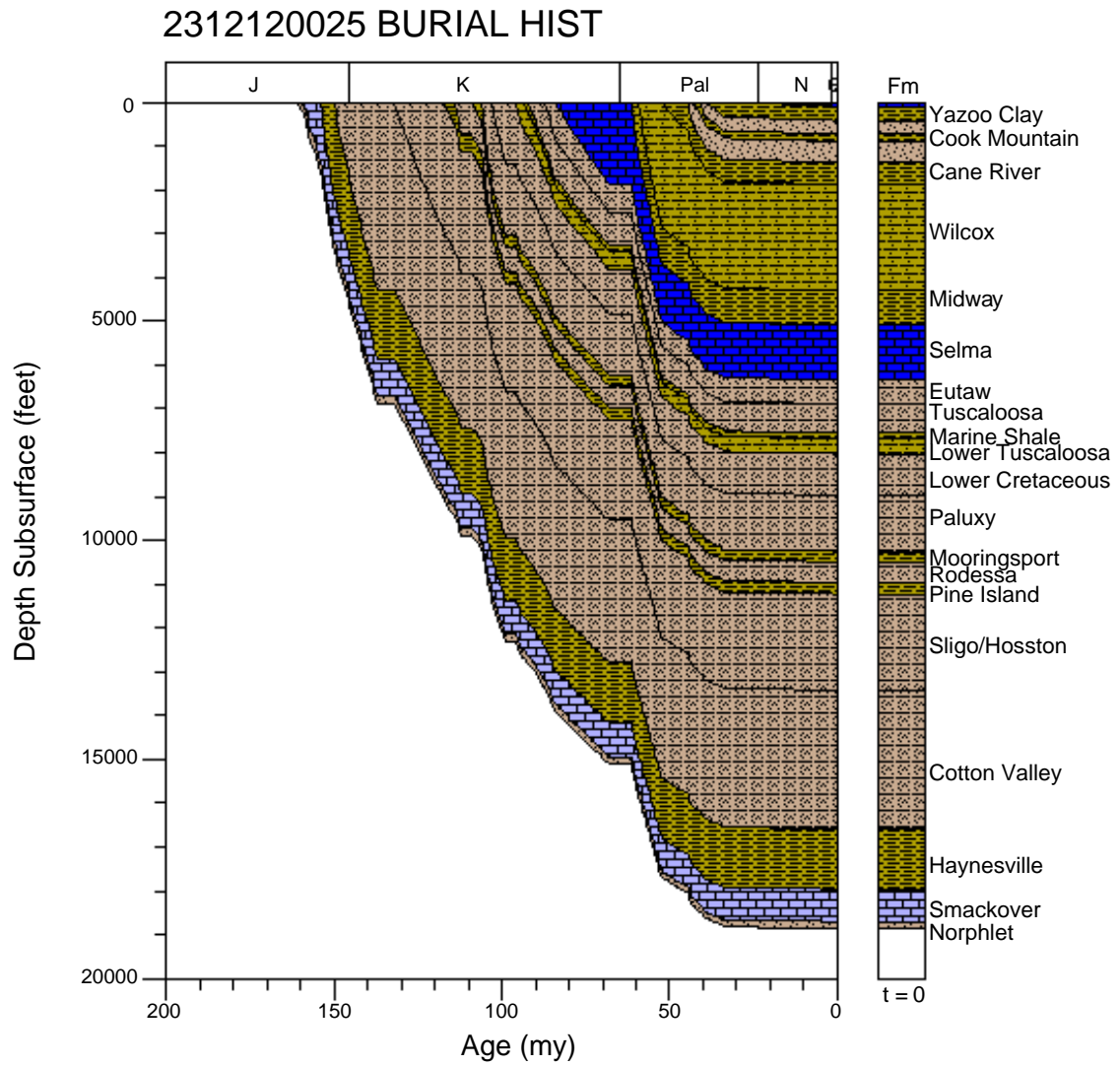


Figure 32. Burial history for well 2312120025, Mississippi Interior Salt Basin.



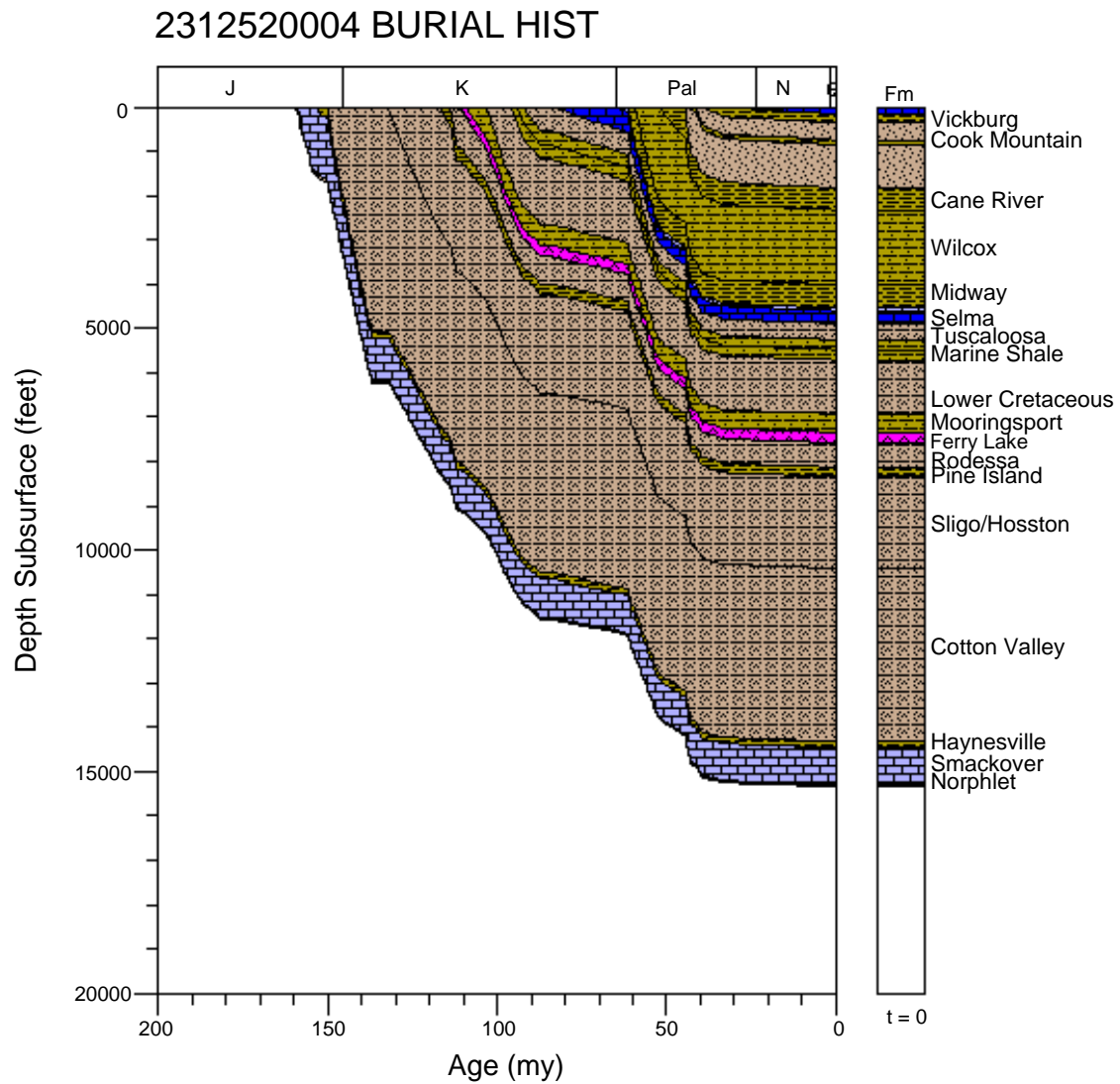


Figure 33. Burial history for well 2312520004, Mississippi Interior Salt Basin.

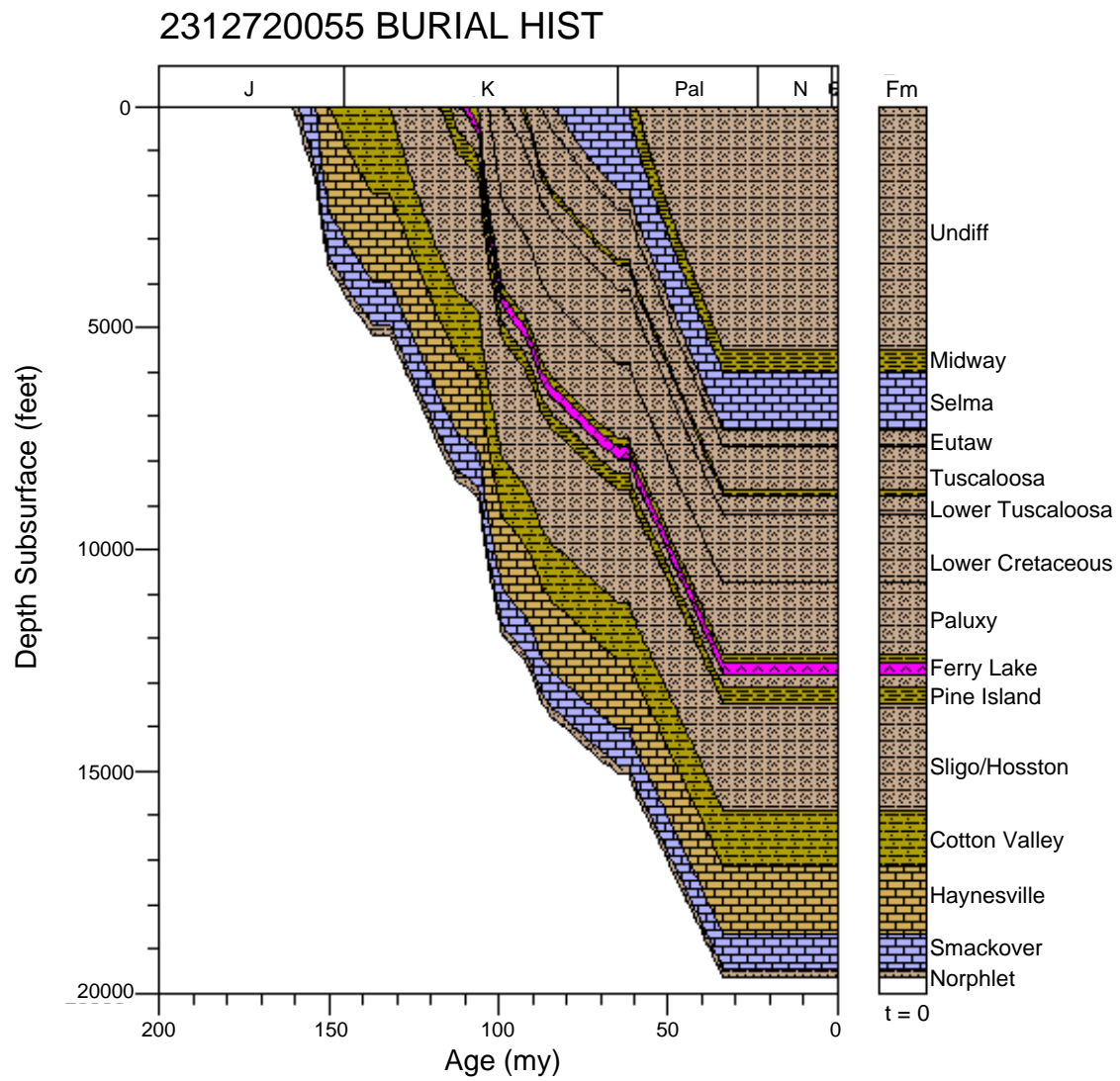


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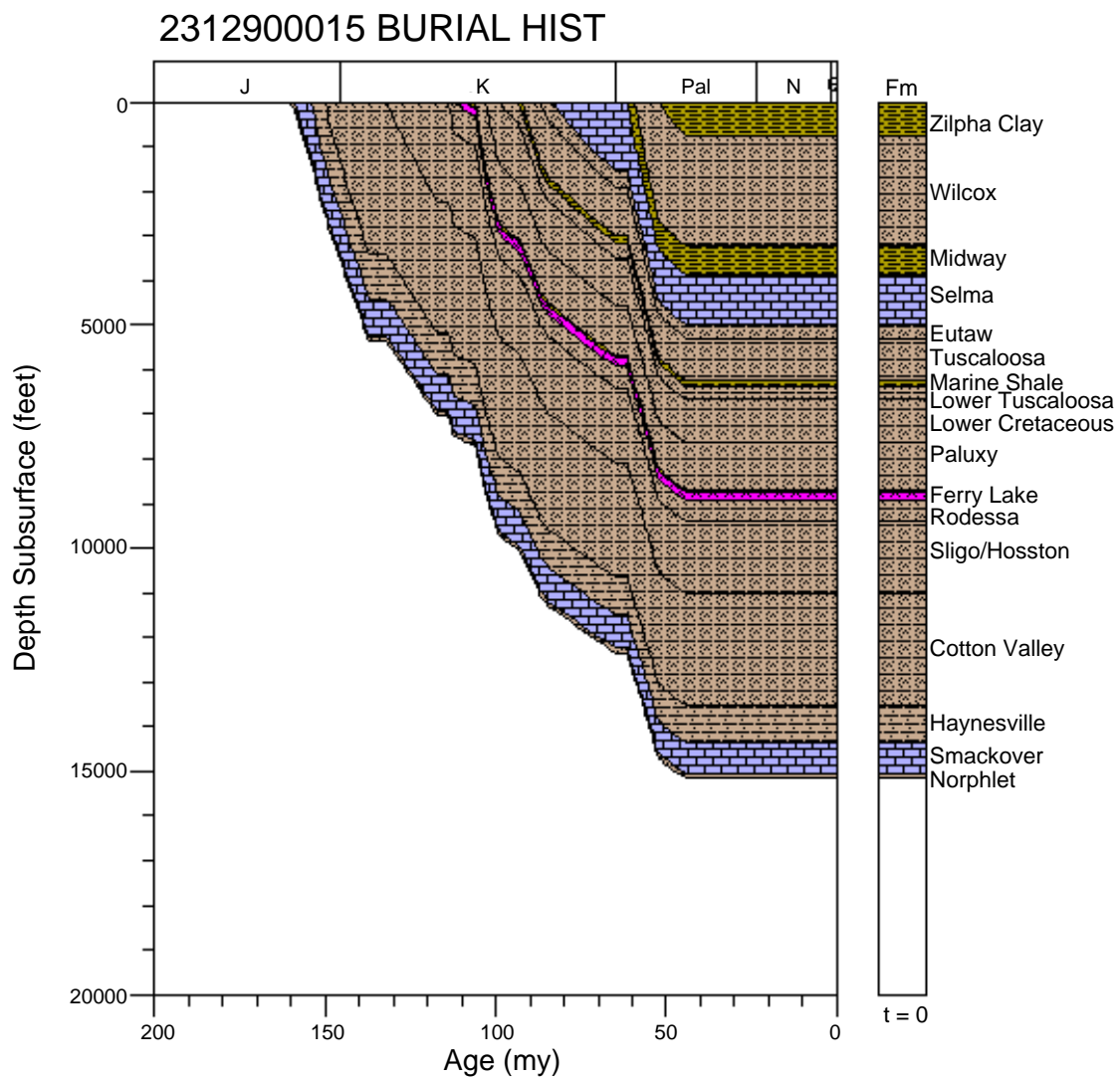


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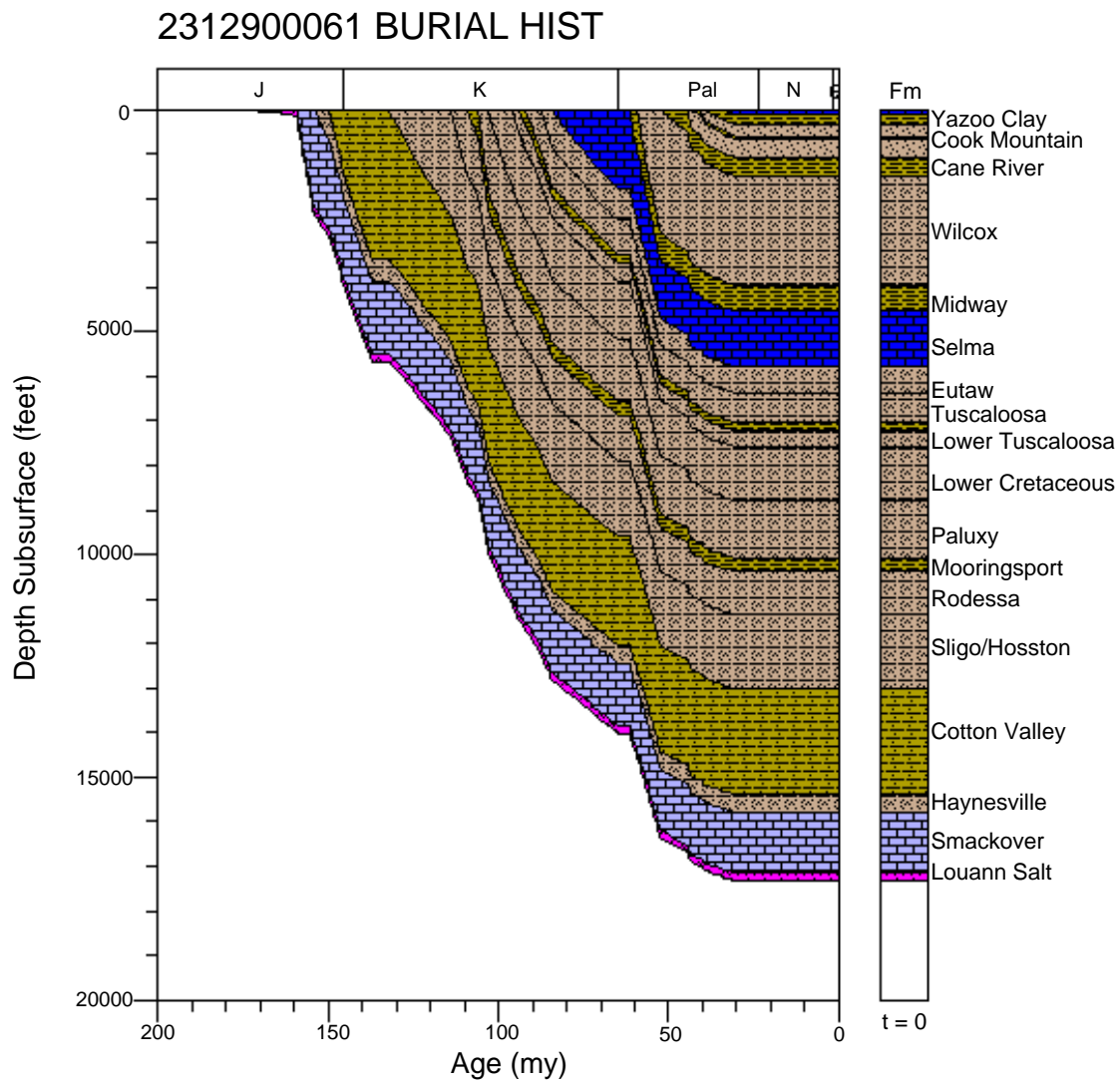


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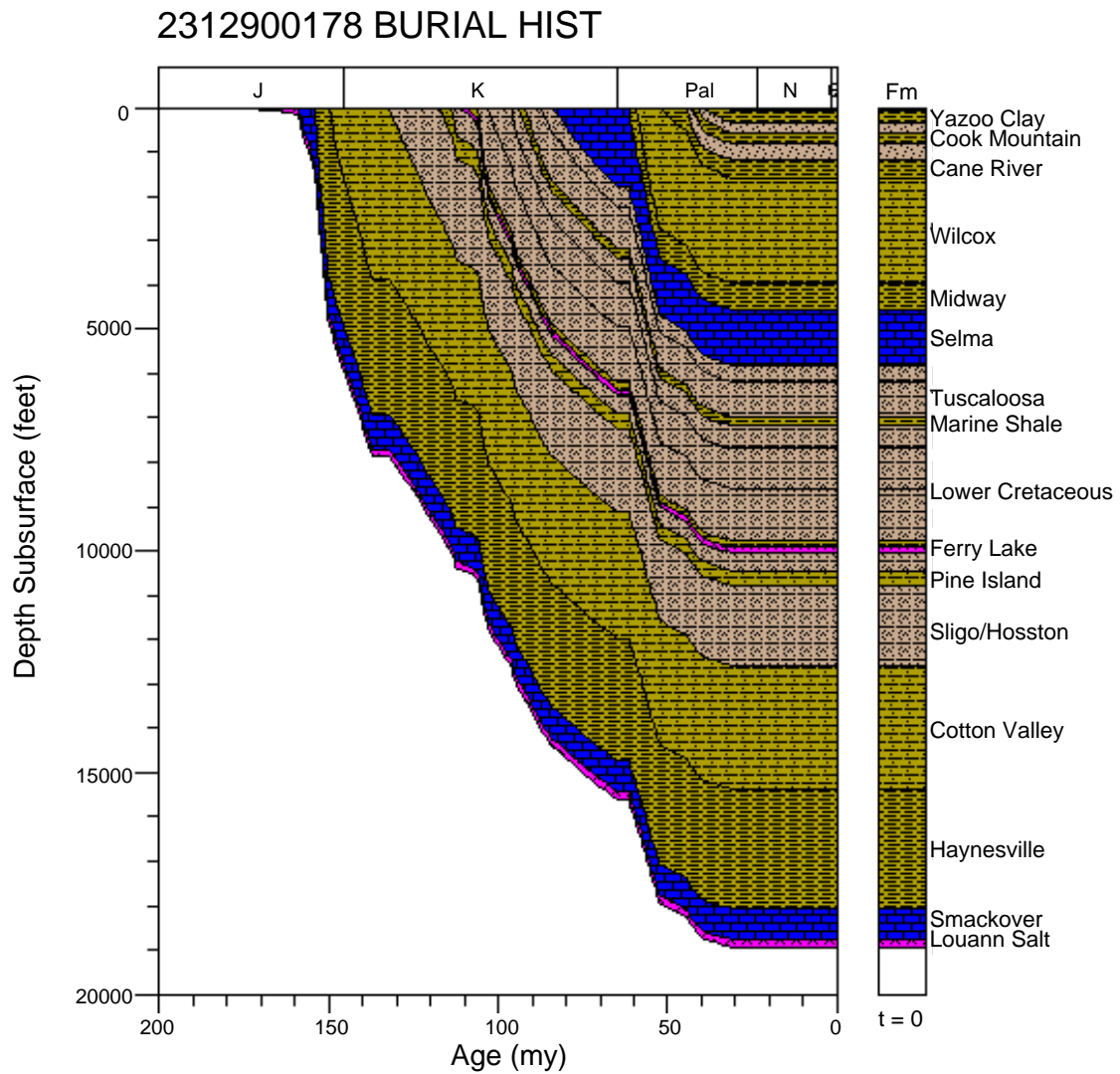


Figure 37. Burial history for well 2312900178, Mississippi Interior Salt Basin.

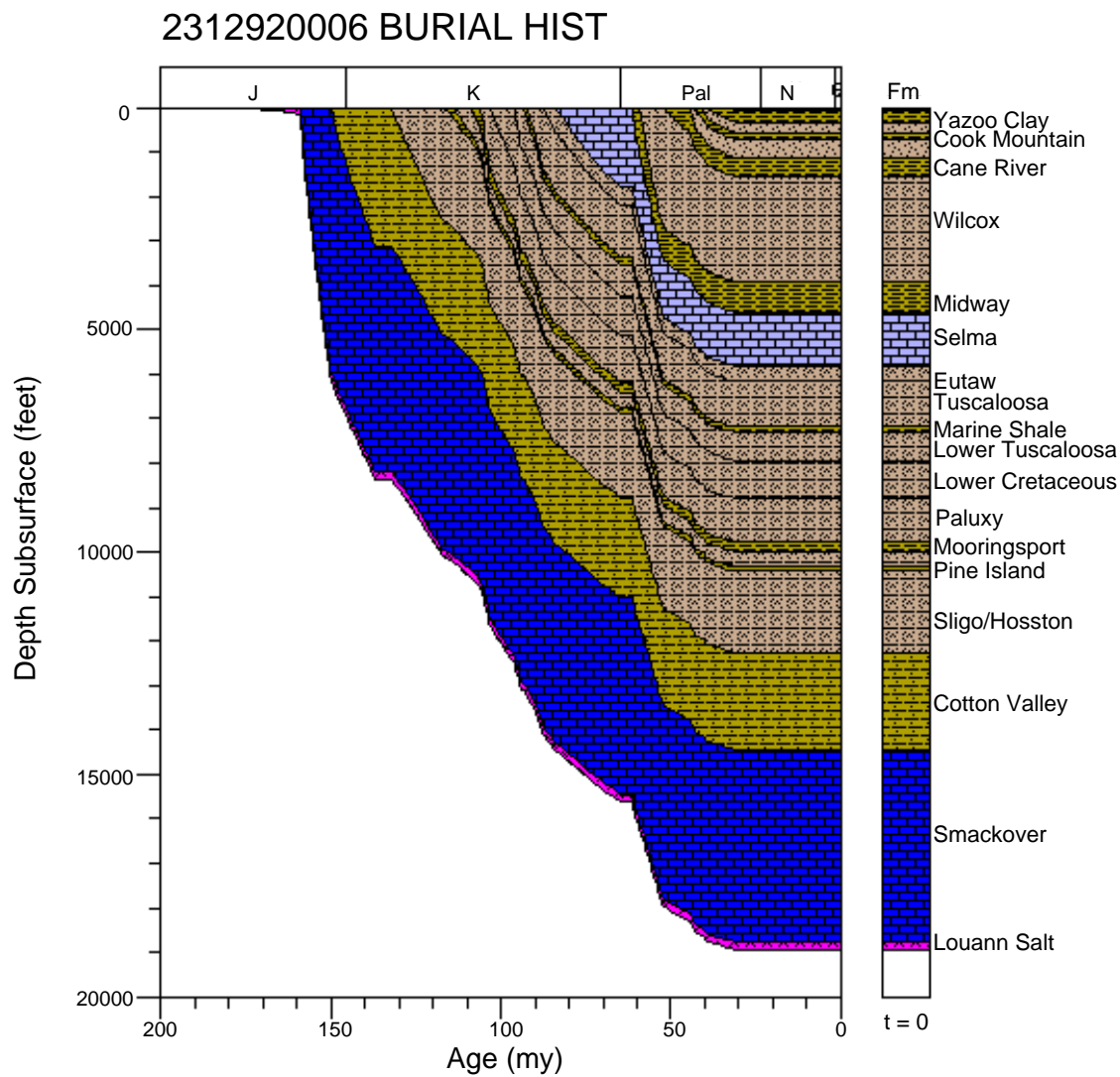


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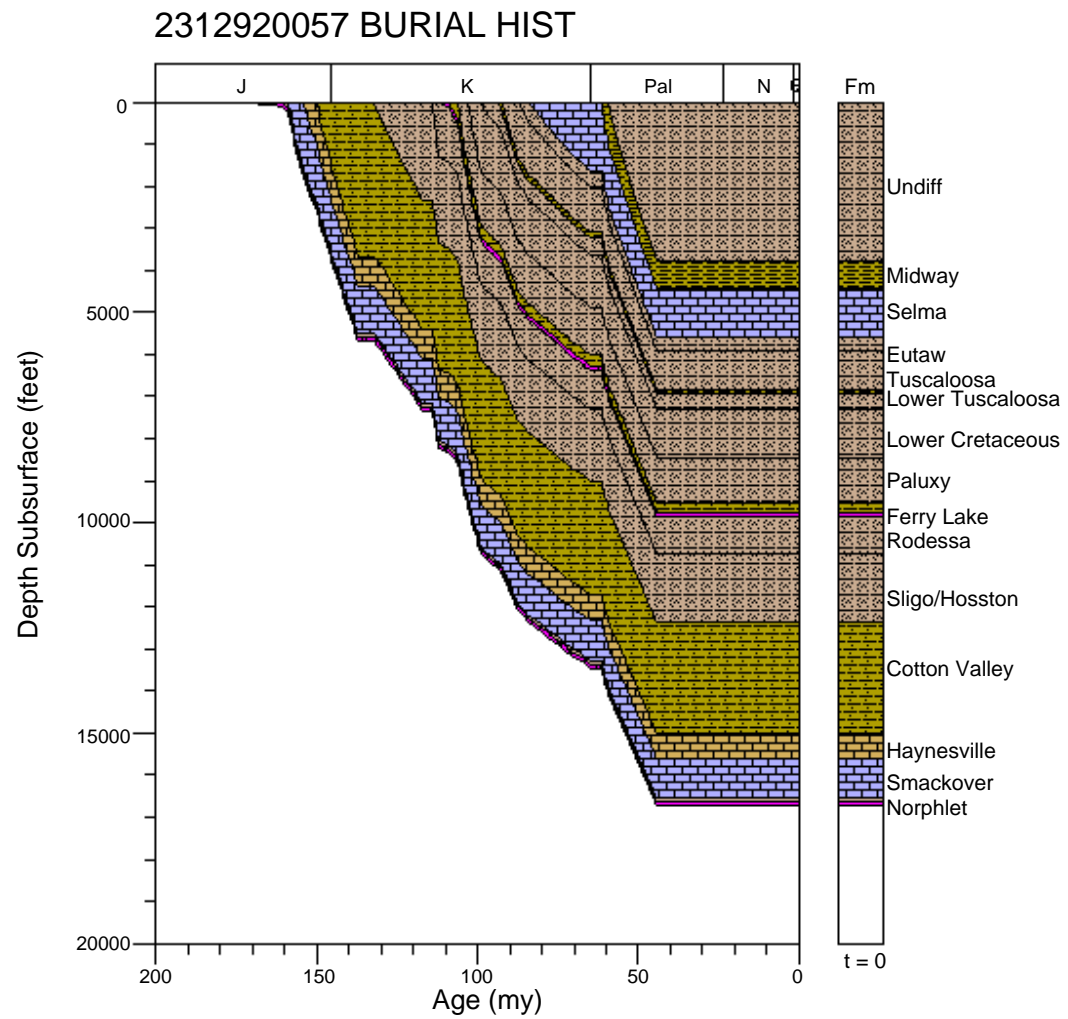


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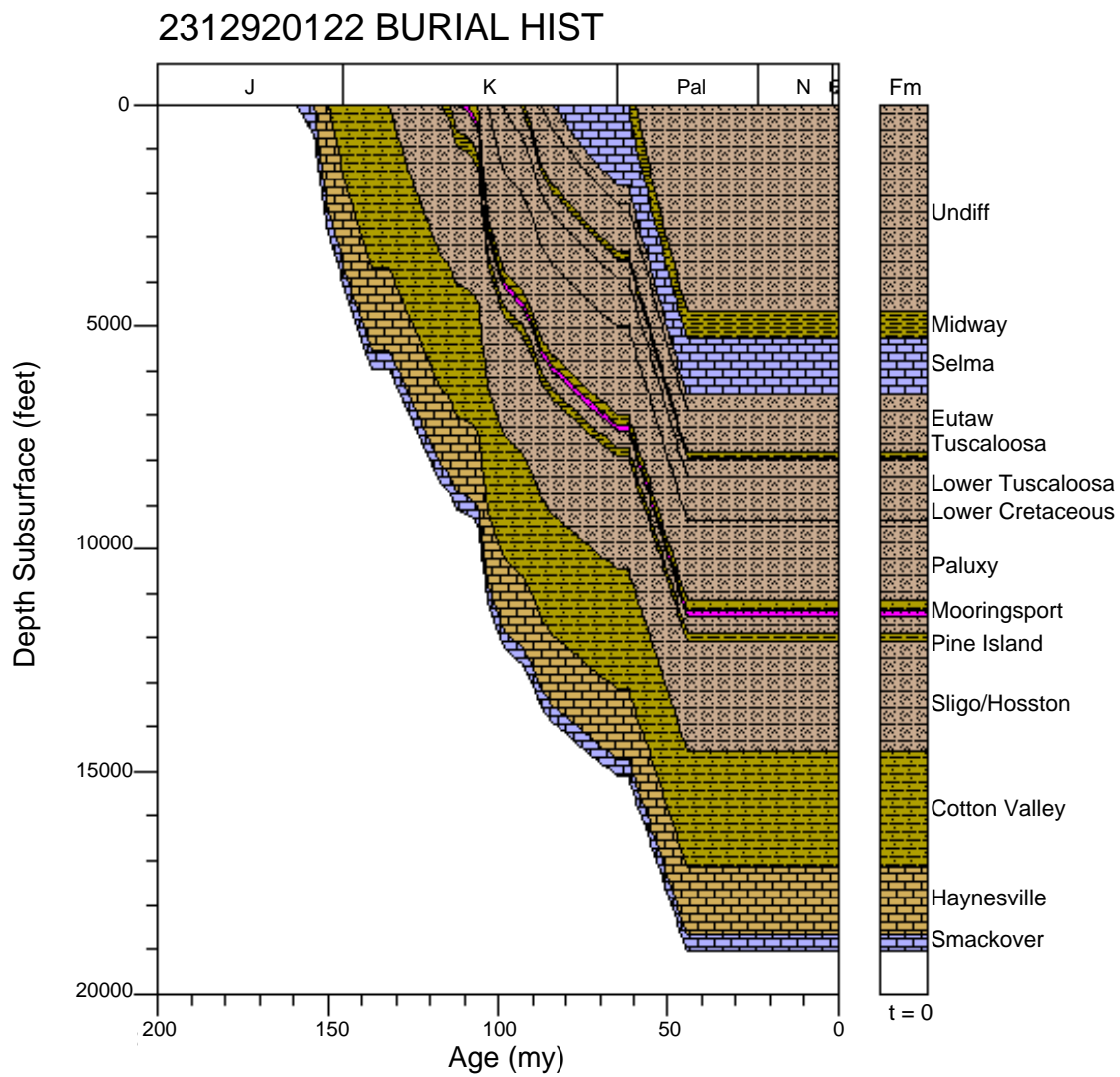


Figure 40. Burial history for well 2312920122, Mississippi Interior Salt Basin.



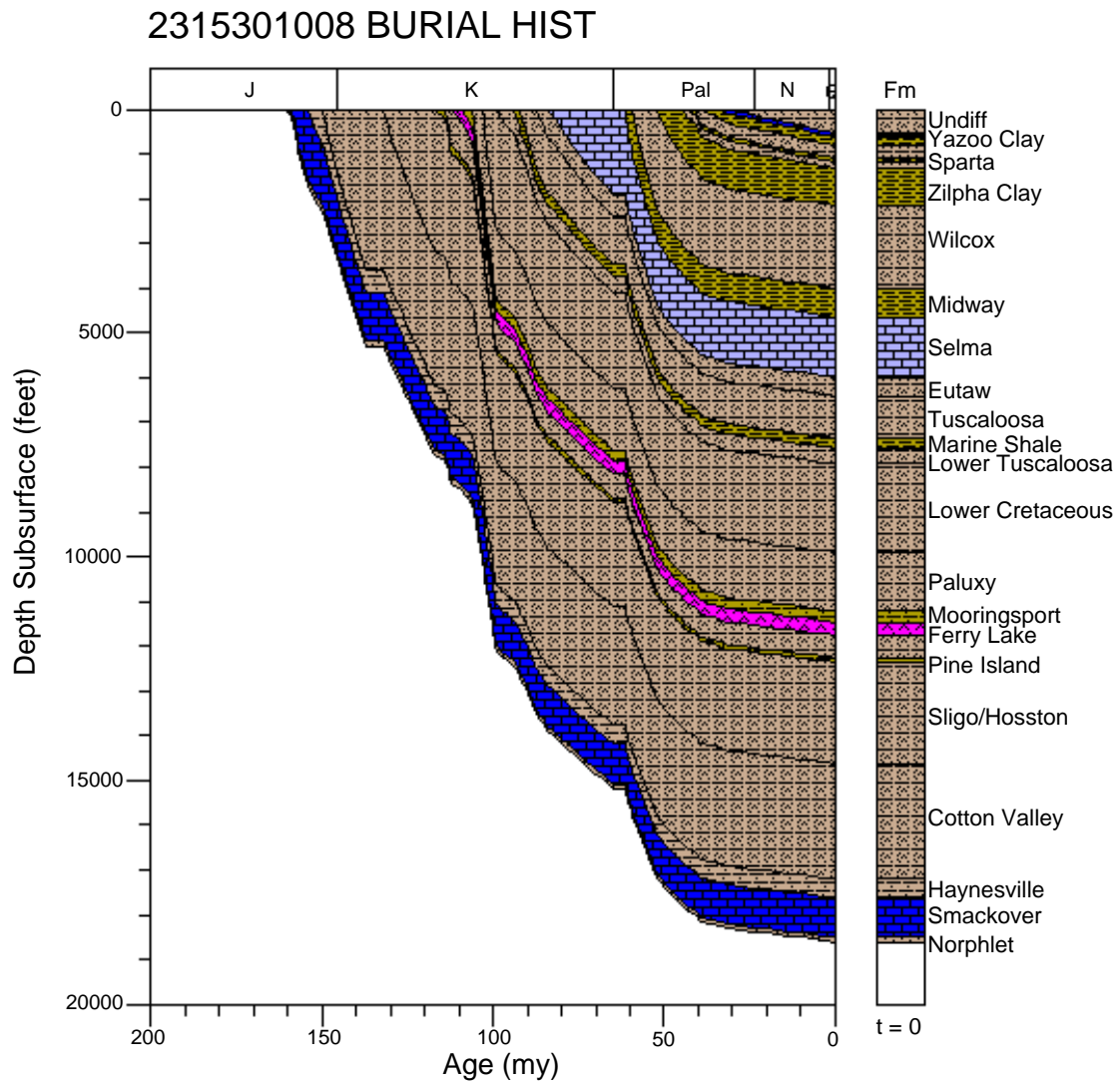


Figure 41. Burial history for well 2315301008, Mississippi Interior Salt Basin.

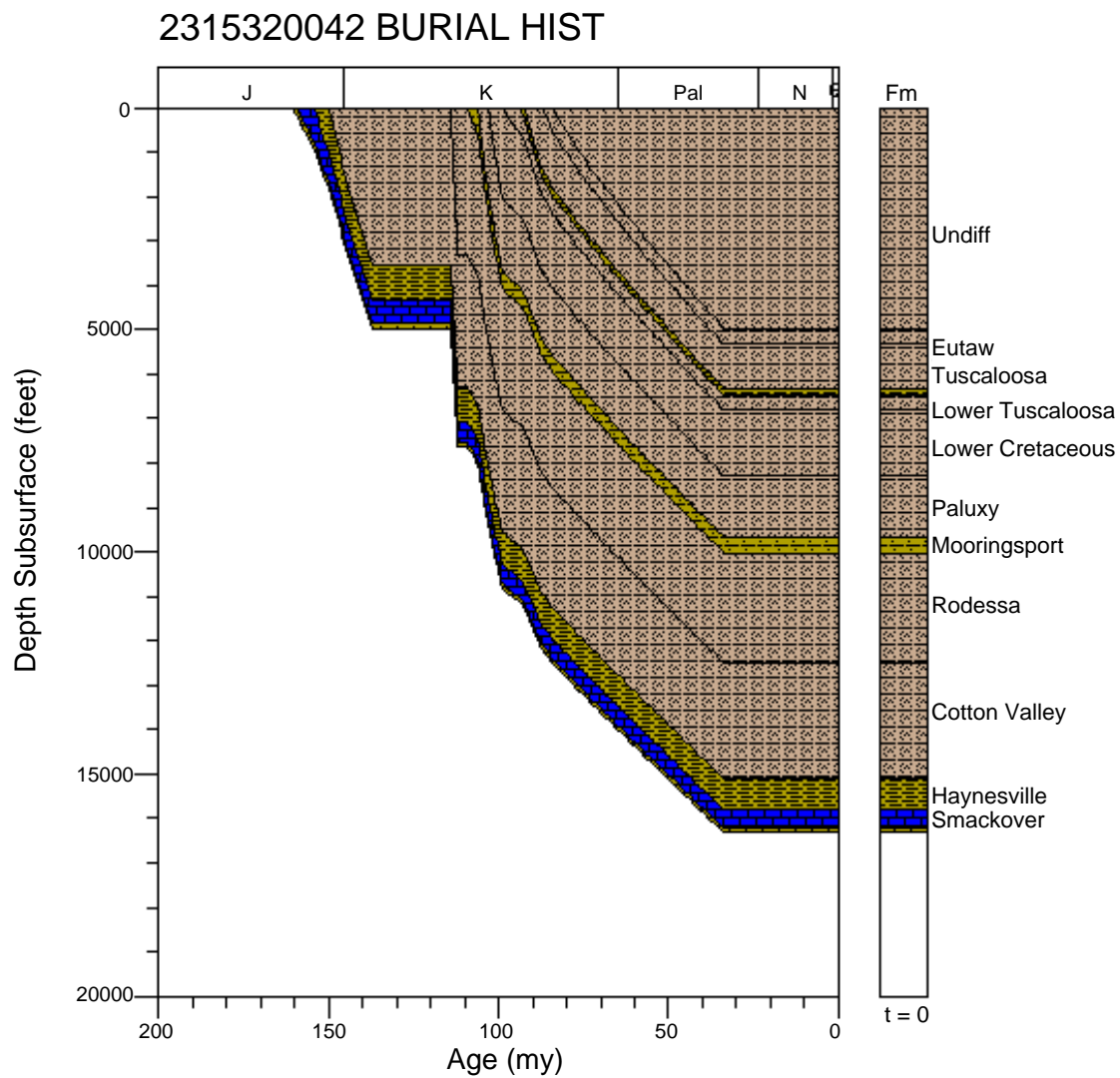


Figure 42. Burial history for well 2315320042, Mississippi Interior Salt Basin.

The figure is a geological cross-section of the Gulf of Mexico continental shelf and slope. The vertical axis represents Depth Subsurface (feet) from 0 to 25,000. The horizontal axis represents Age (my) from 200 to 0. The section is divided into four columns labeled J, K, Pal, and N. A legend on the right identifies the following formations: Undiff, Midway, Selma, Eutaw, Tuscaloosa, Lower Tuscaloosa, Lower Cretaceous, Paluxy, Mooringsport, Pine Island, Sligo/Hosston, Cotton Valley, Haynesville, and Smackover. A pink line highlights a specific geological feature, likely a fault or a specific stratigraphic boundary, running through the section.

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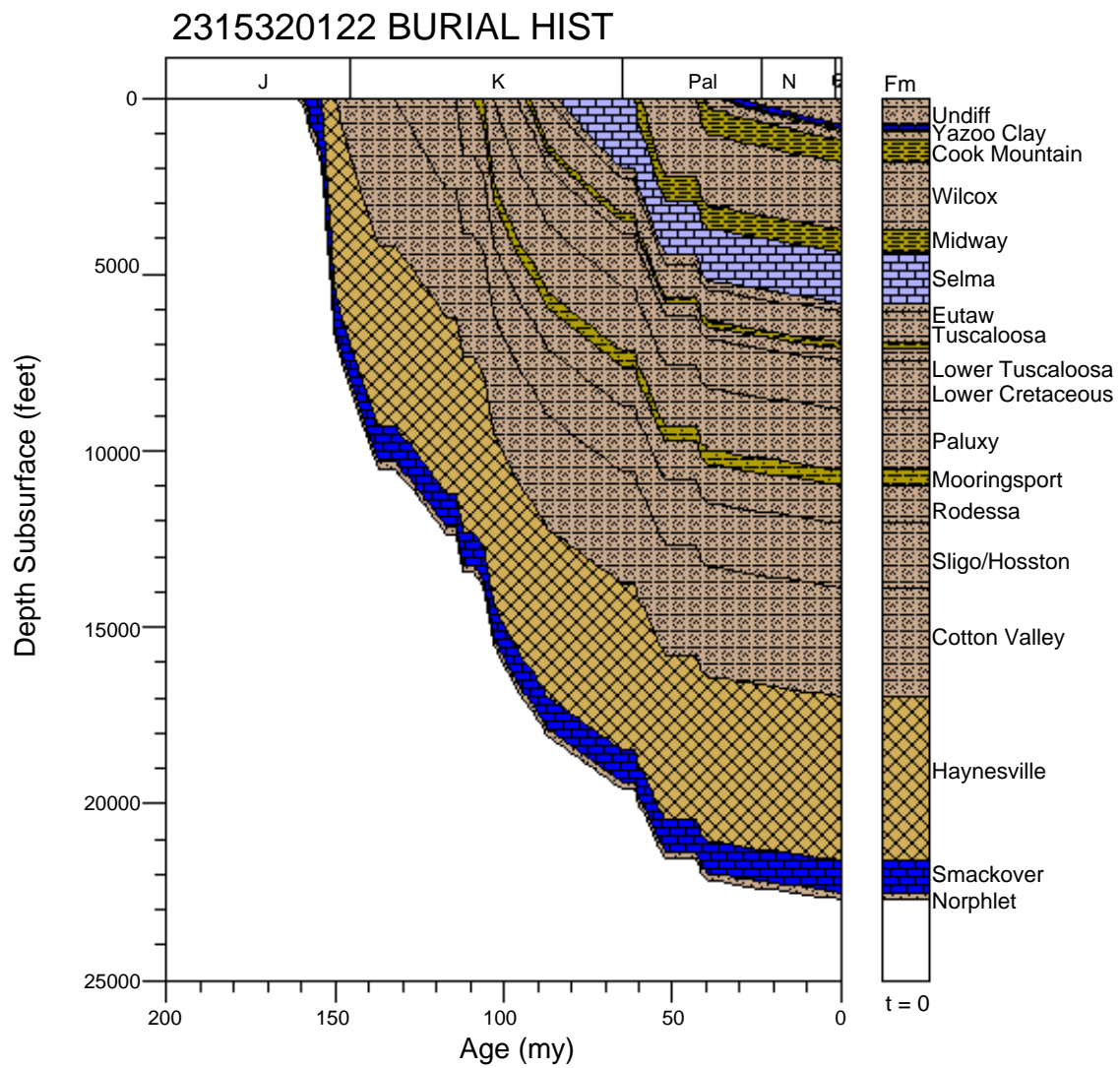


Figure 44. Burial history for well 2315320122, Mississippi Interior Salt Basin.

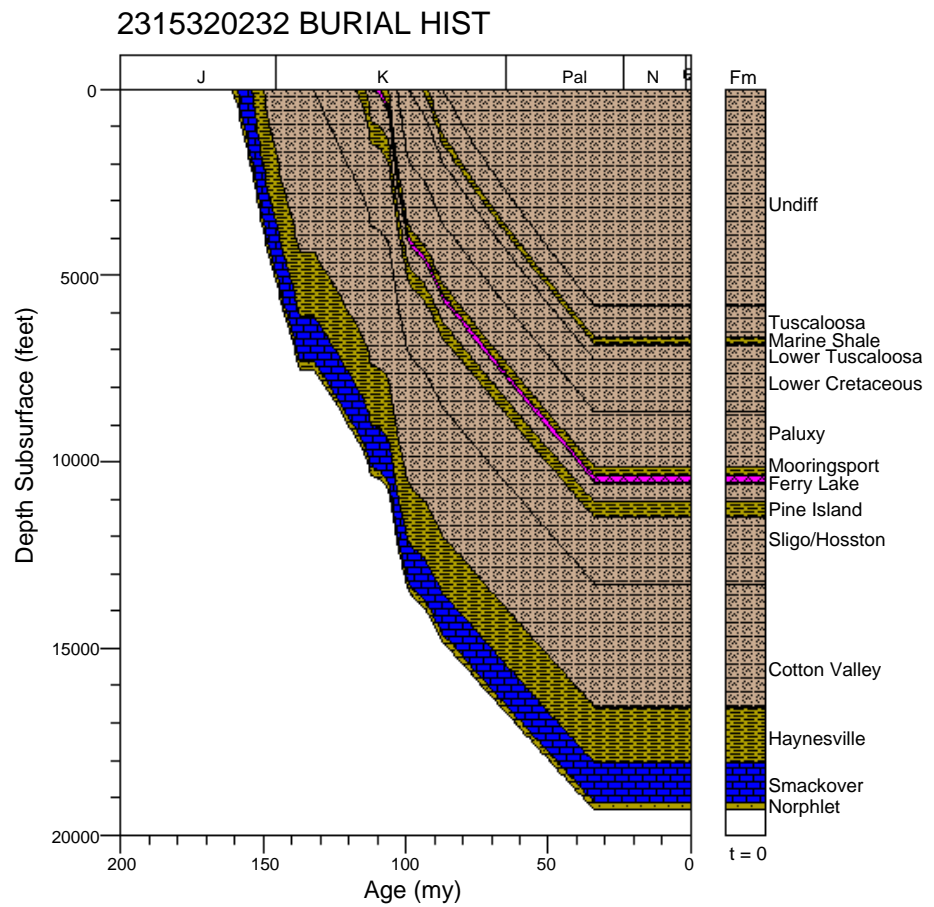


Figure 45. Burial history for well 2315320232, Mississippi Interior Salt Basin.

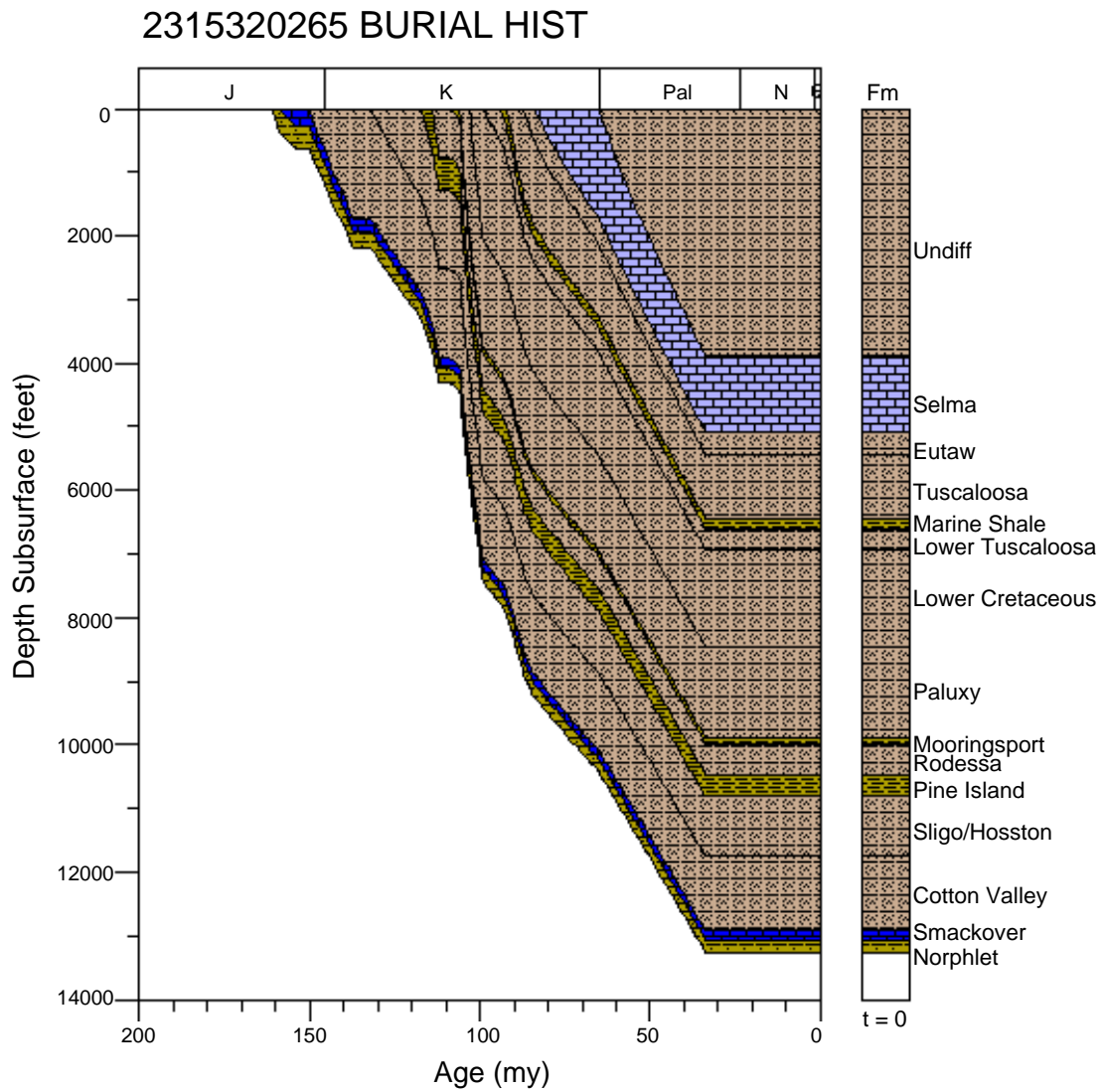


Figure 46. Burial history for well 2315320265, Mississippi Interior Salt Basin.



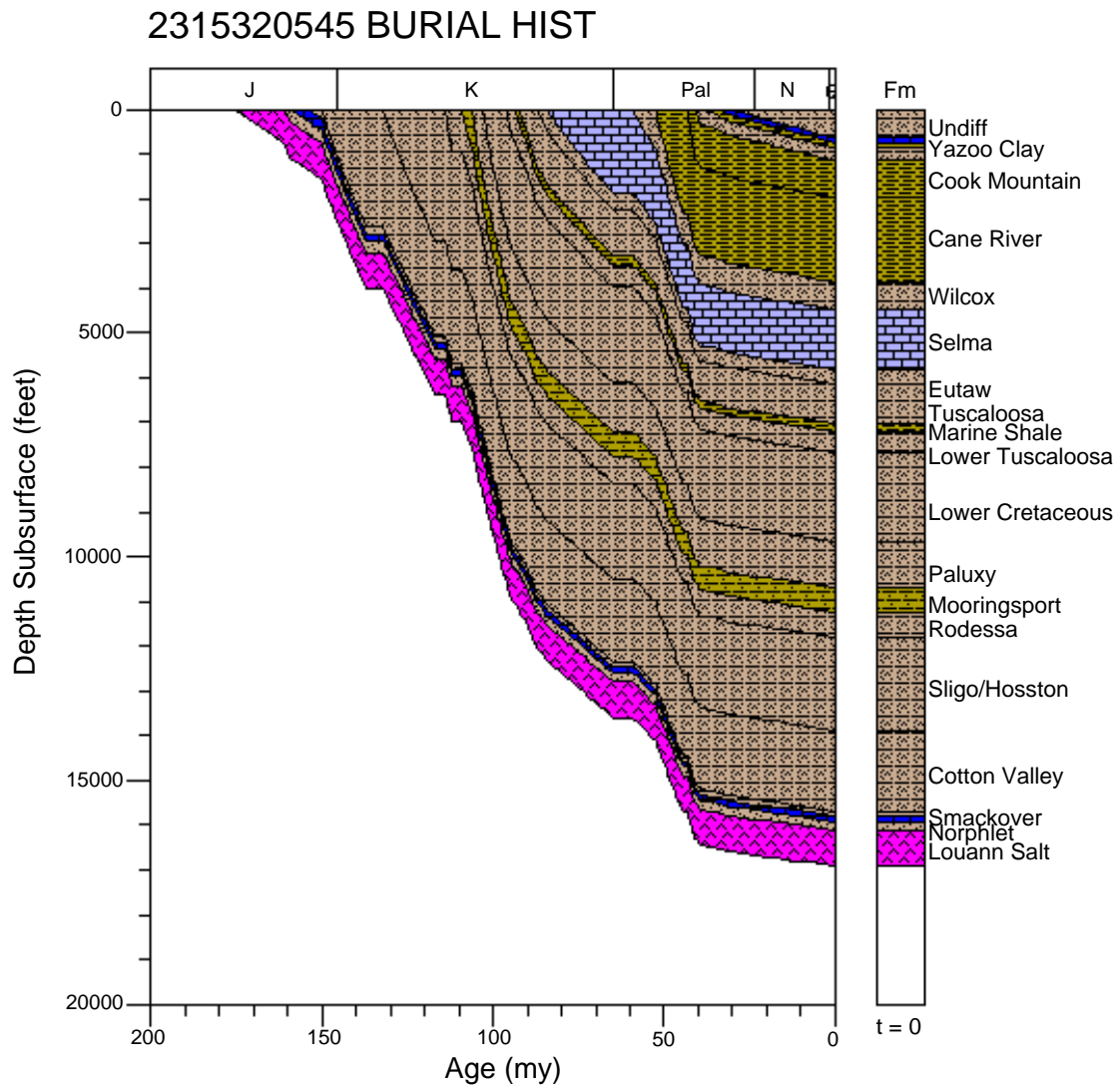


Figure 47. Burial history for well 2315320545, Mississippi Interior Salt Basin.

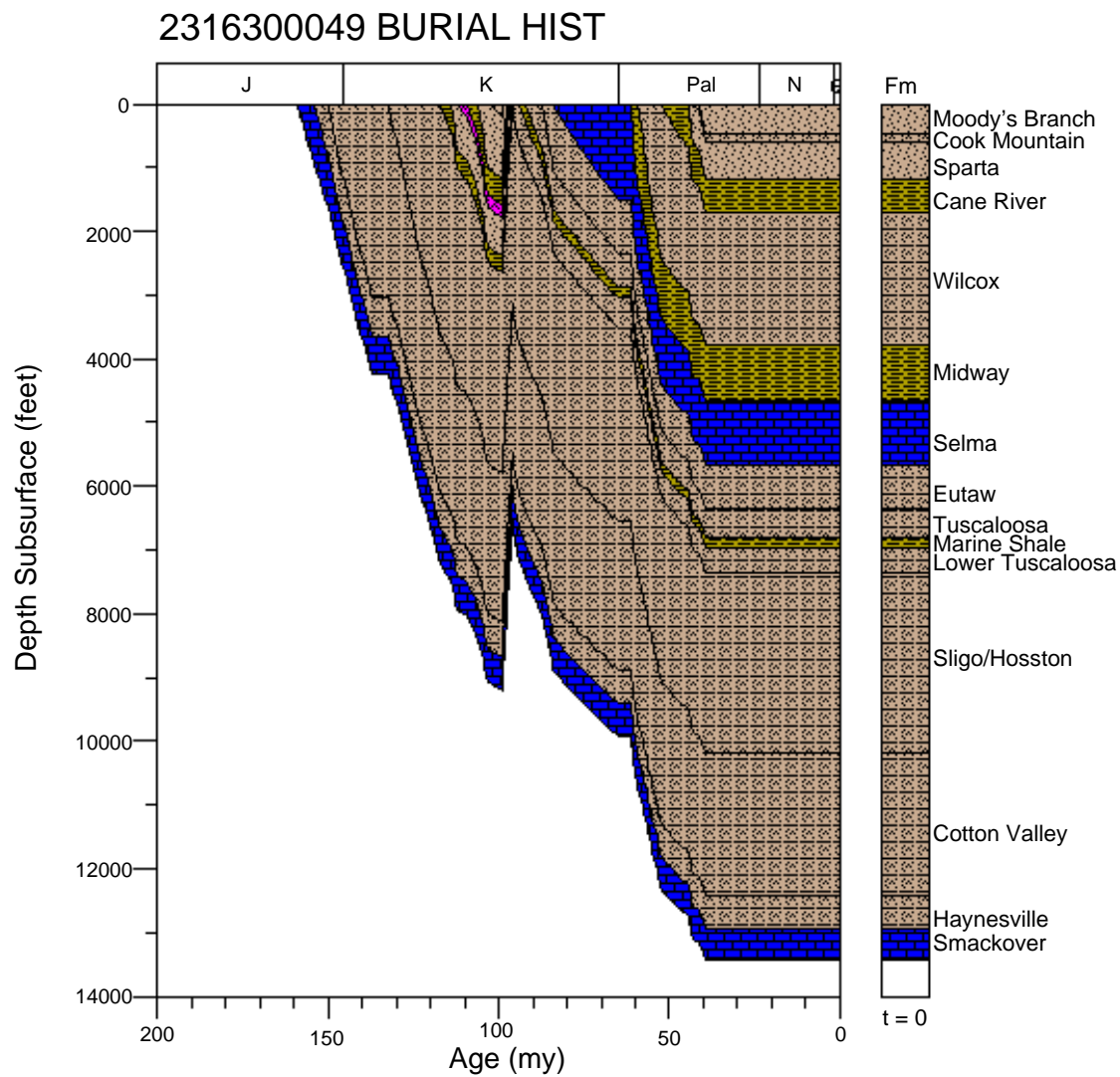


Figure 48. Burial history for well 2316300049, Mississippi Interior Salt Basin.



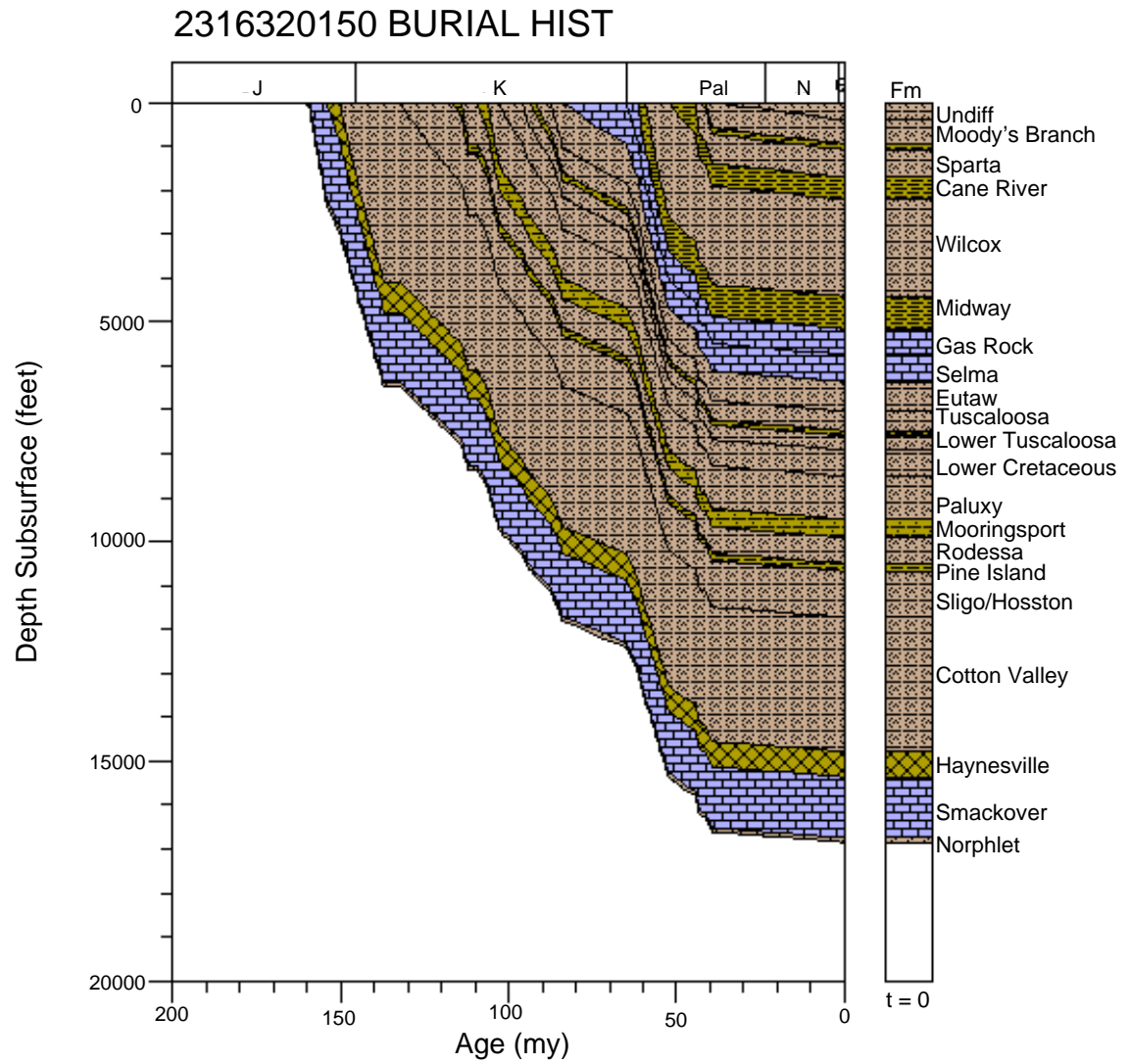


Figure 49. Burial history for well 2316320150, Mississippi Interior Salt Basin.

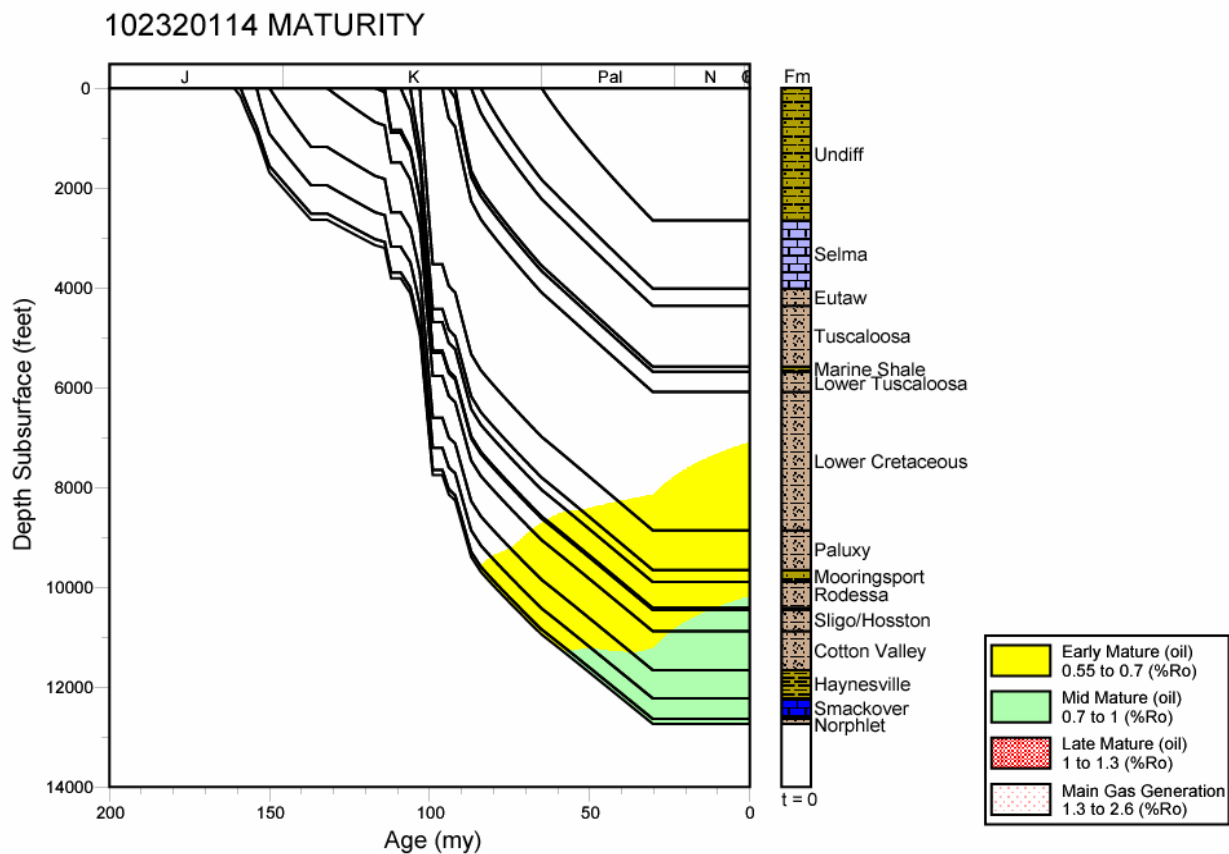


Figure 50. Thermal maturation profile for well 102320114, Mississippi Interior Salt Basin.

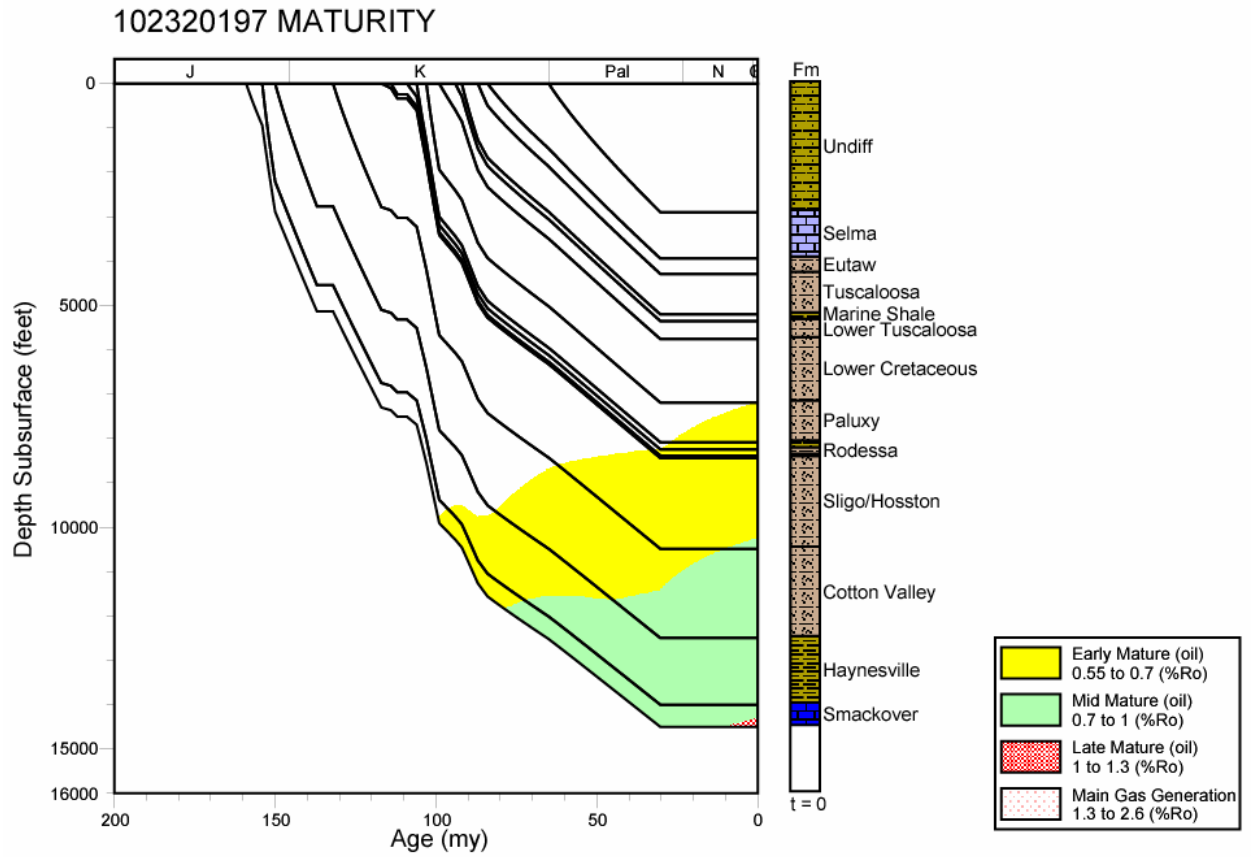


Figure 51. Thermal maturation profile for well 102320197, Mississippi Interior Salt Basin.

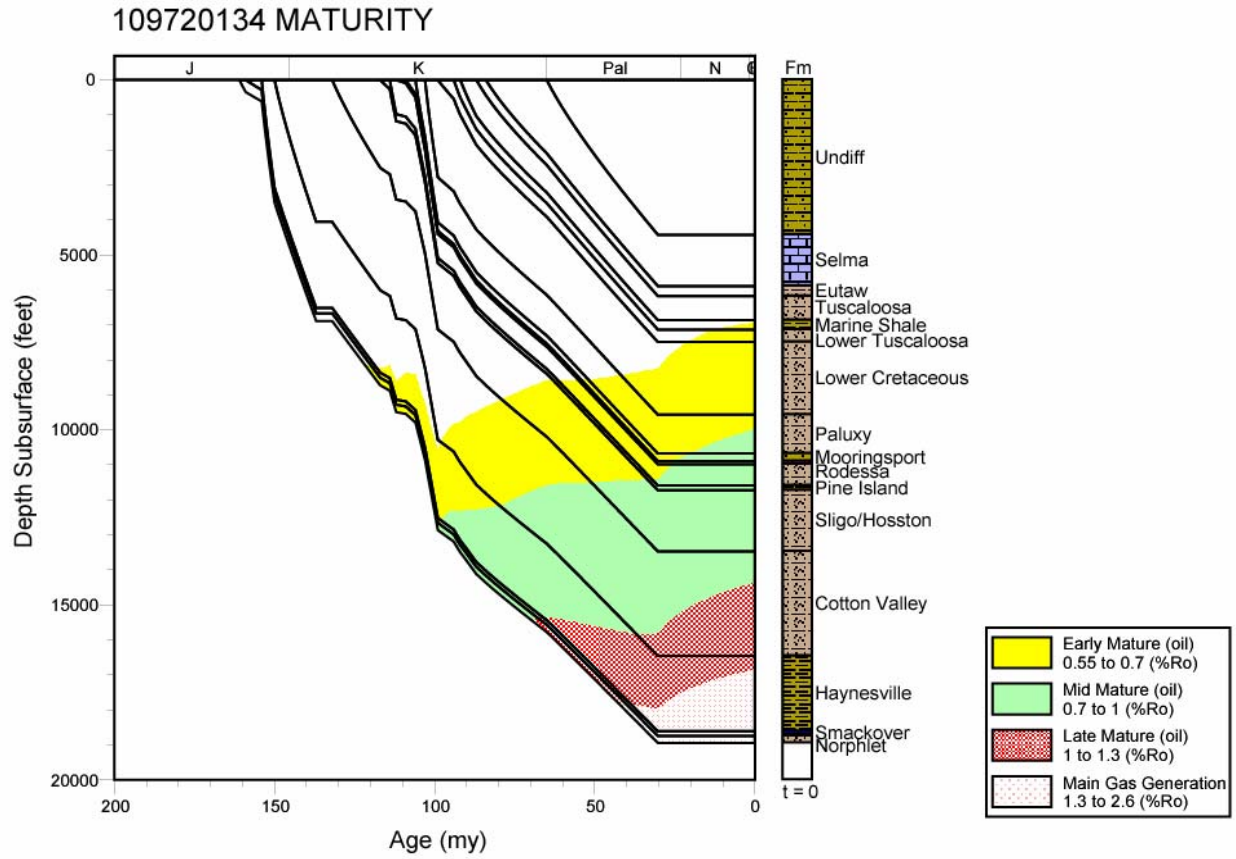


Figure 52. Thermal maturation profile for well 109720134, Mississippi Interior Salt Basin.

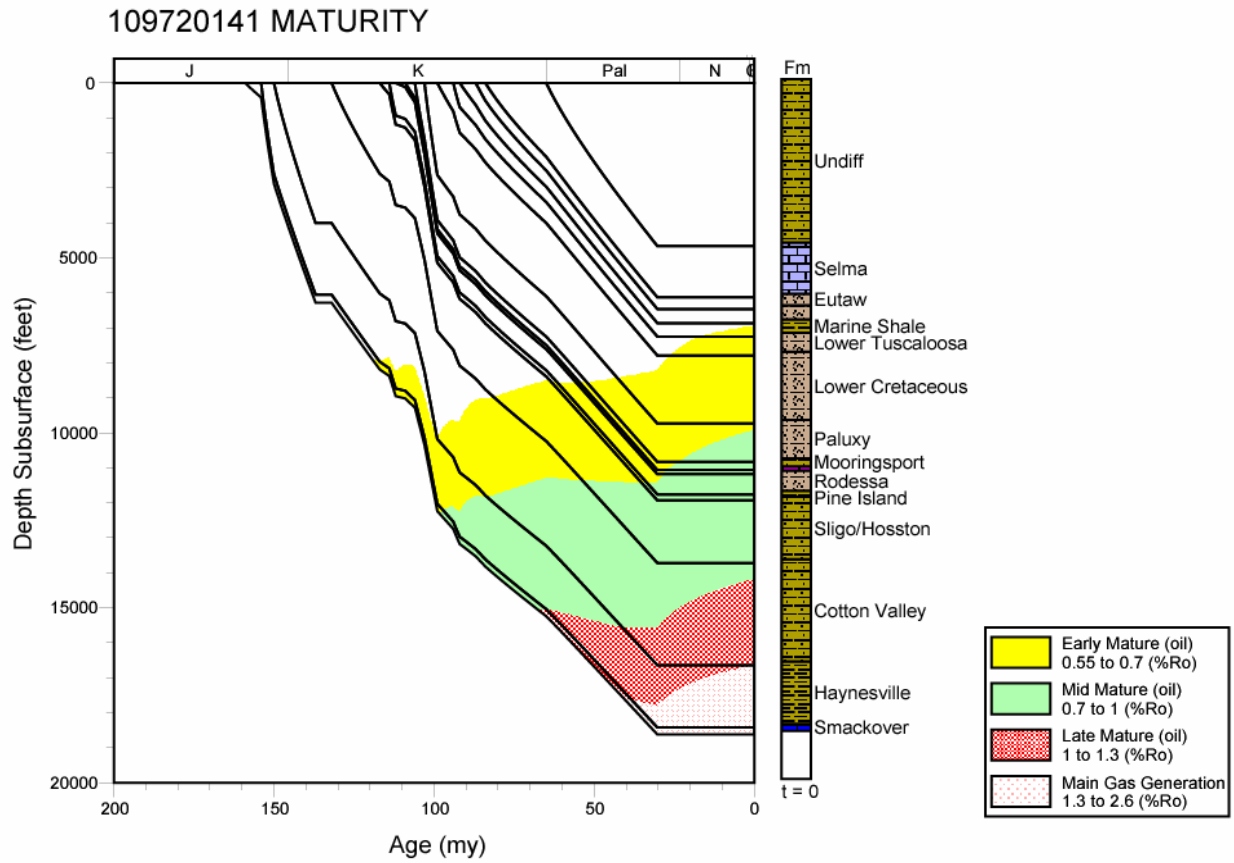


Figure 53. Thermal maturation profile for well 109720141, Mississippi Interior Salt Basin.

# 109720299 MATURITY

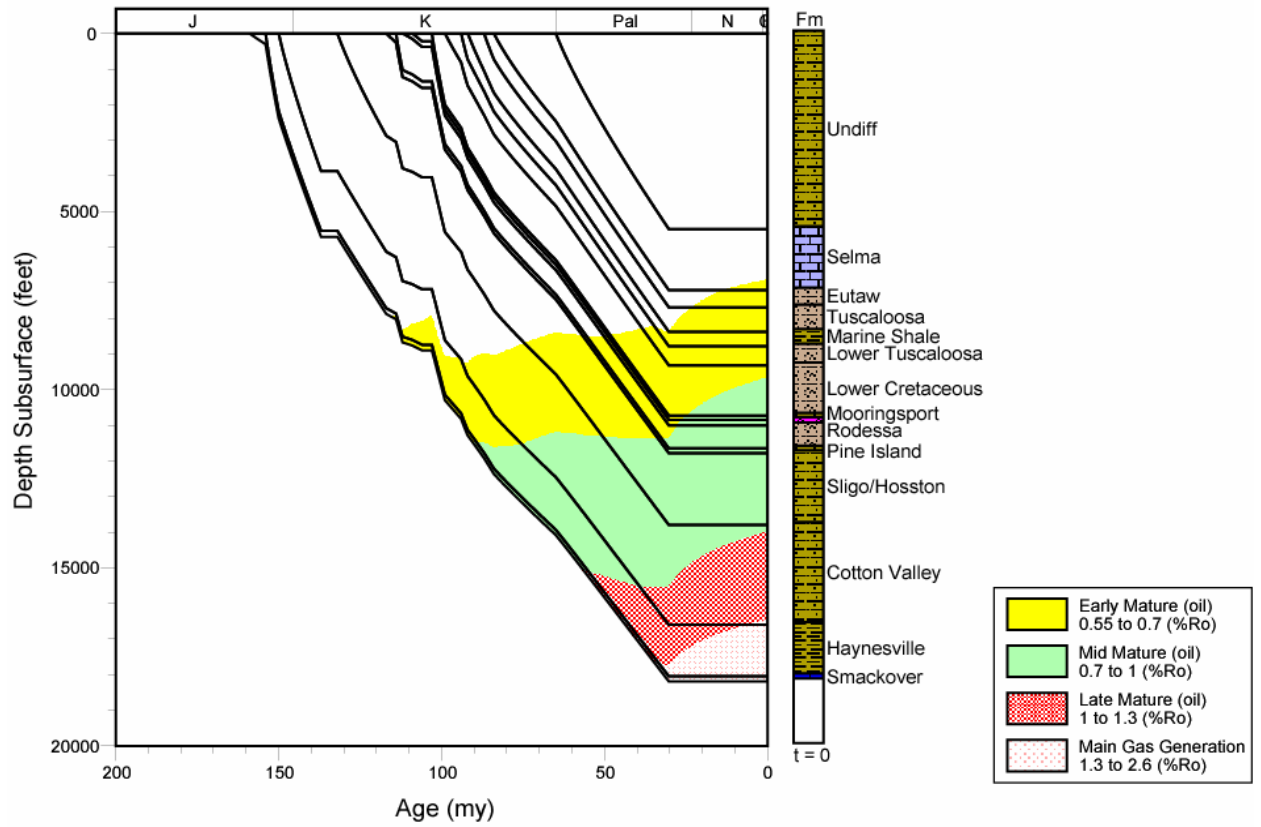


Figure 54. Thermal maturation profile for well 109720299, Mississippi Interior Salt Basin.

# 112920012 MATURITY

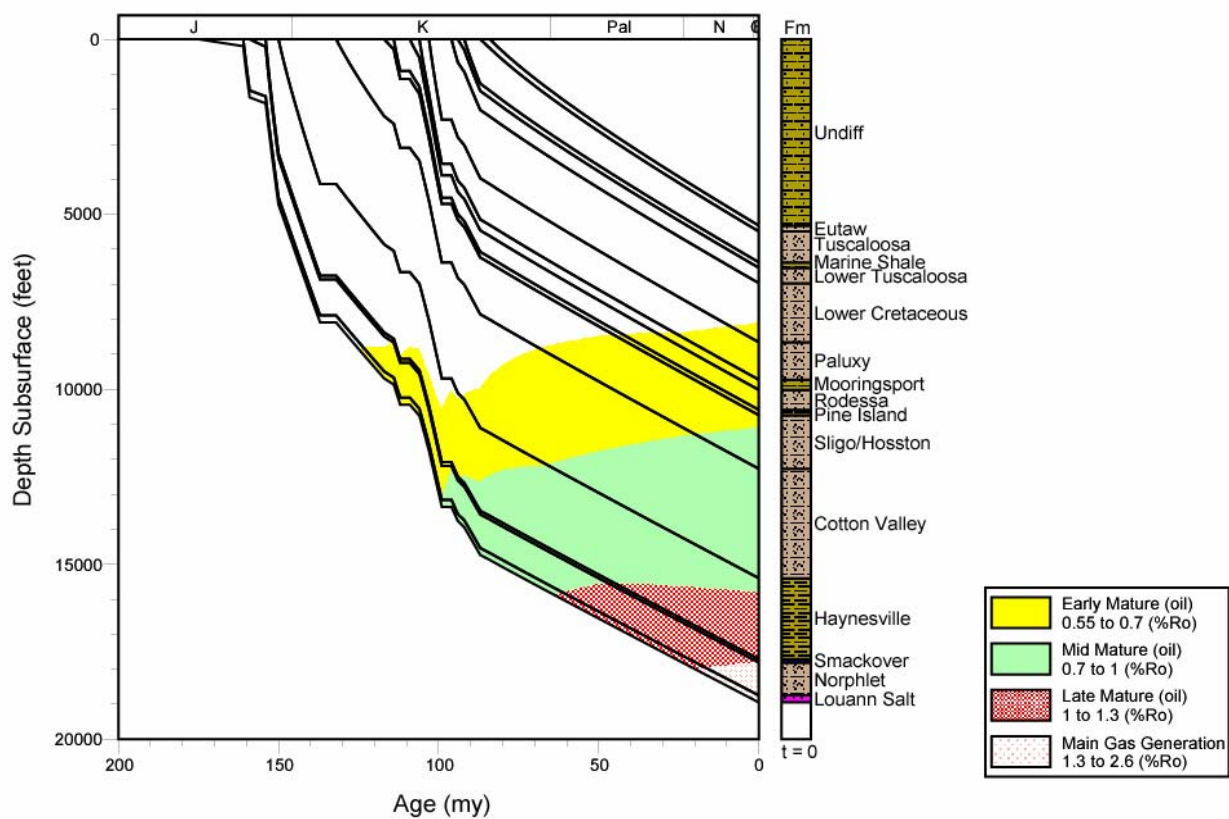


Figure 55. Thermal maturation profile for well 112920012, Mississippi Interior Salt Basin.

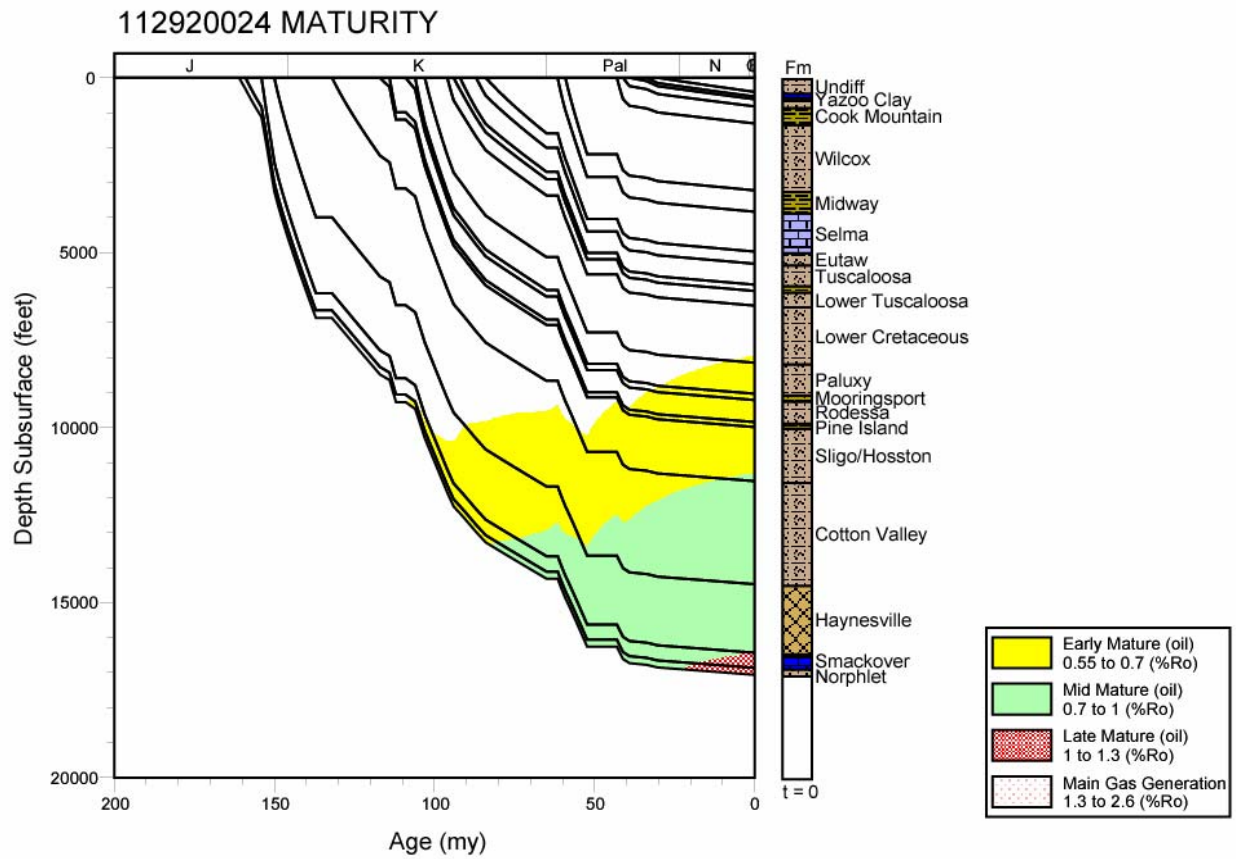


Figure 56. Thermal maturation profile for well 112920024, Mississippi Interior Salt Basin.



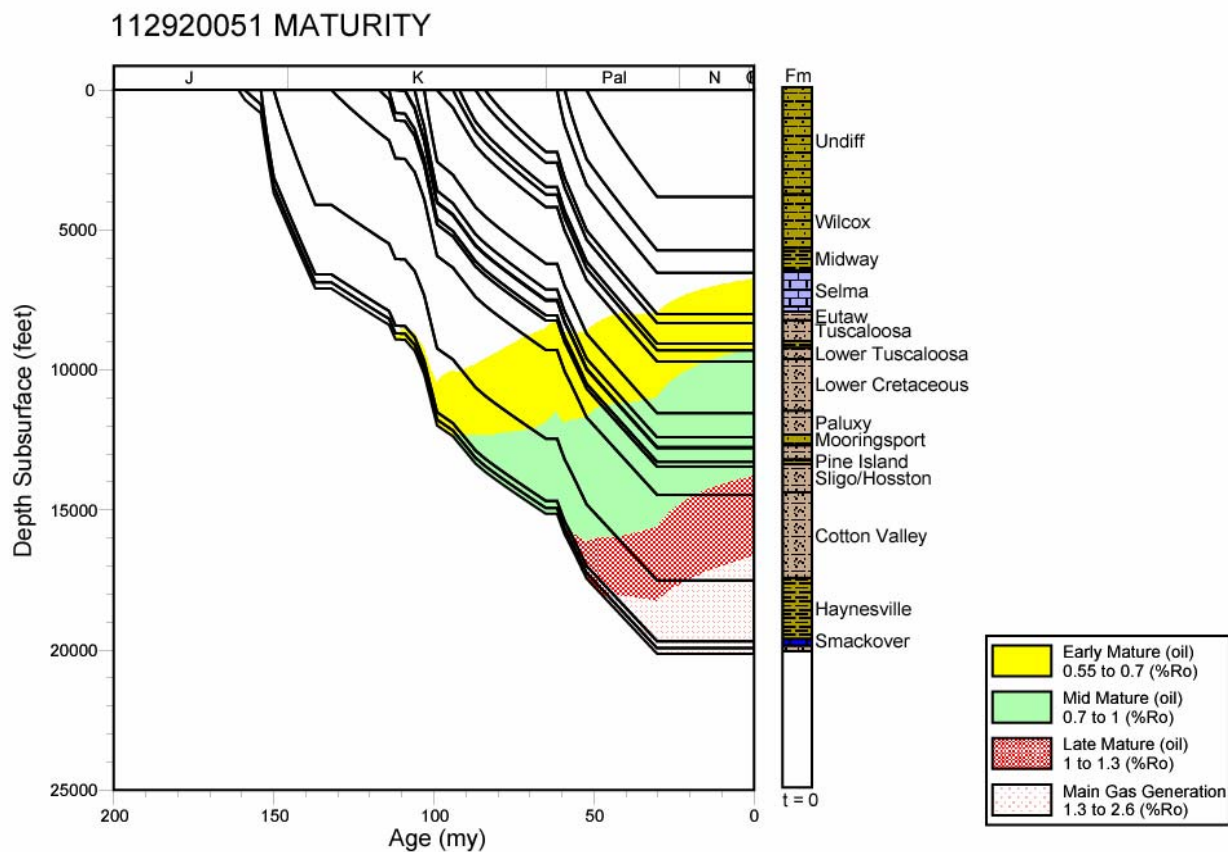


Figure 57. Thermal maturation profile for well 112920051, Mississippi Interior Salt Basin.

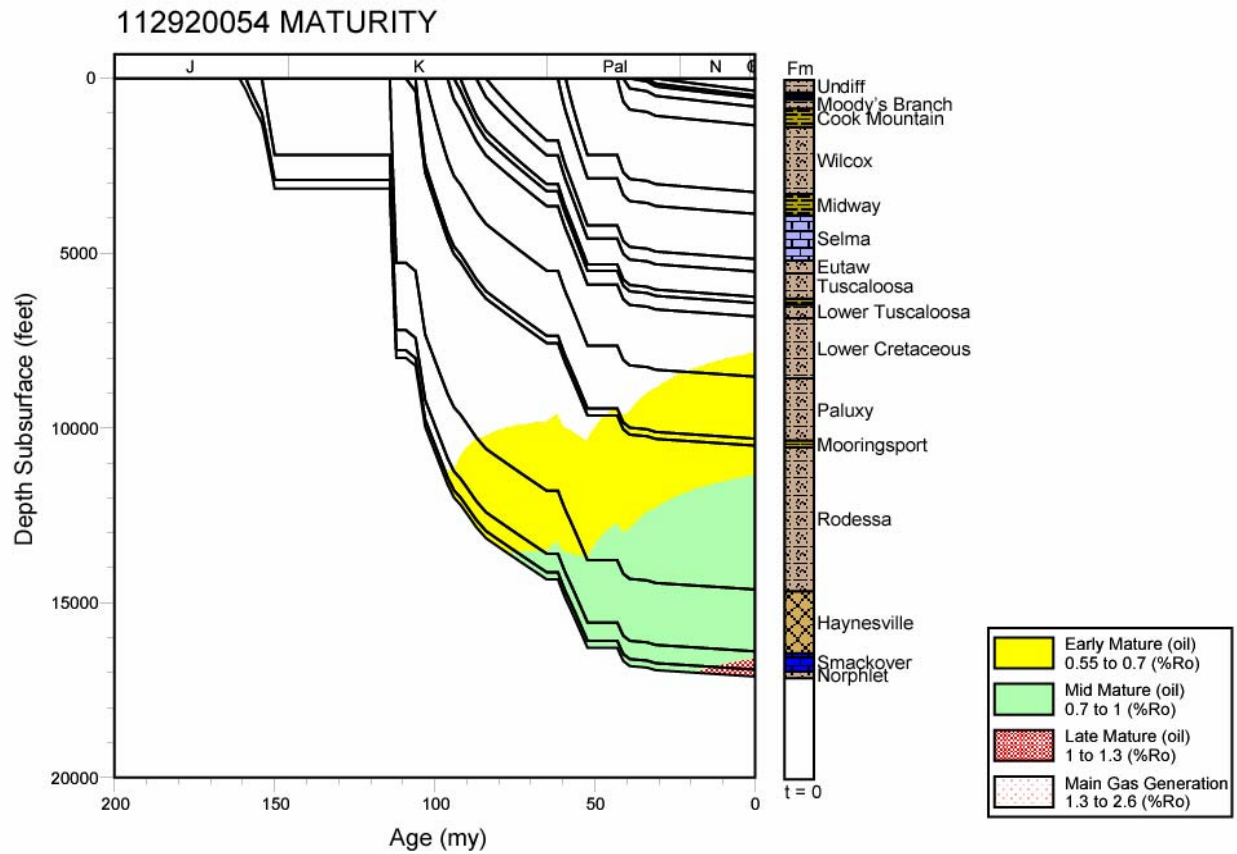


Figure 58. Thermal maturation profile for well 112920054, Mississippi Interior Salt Basin.

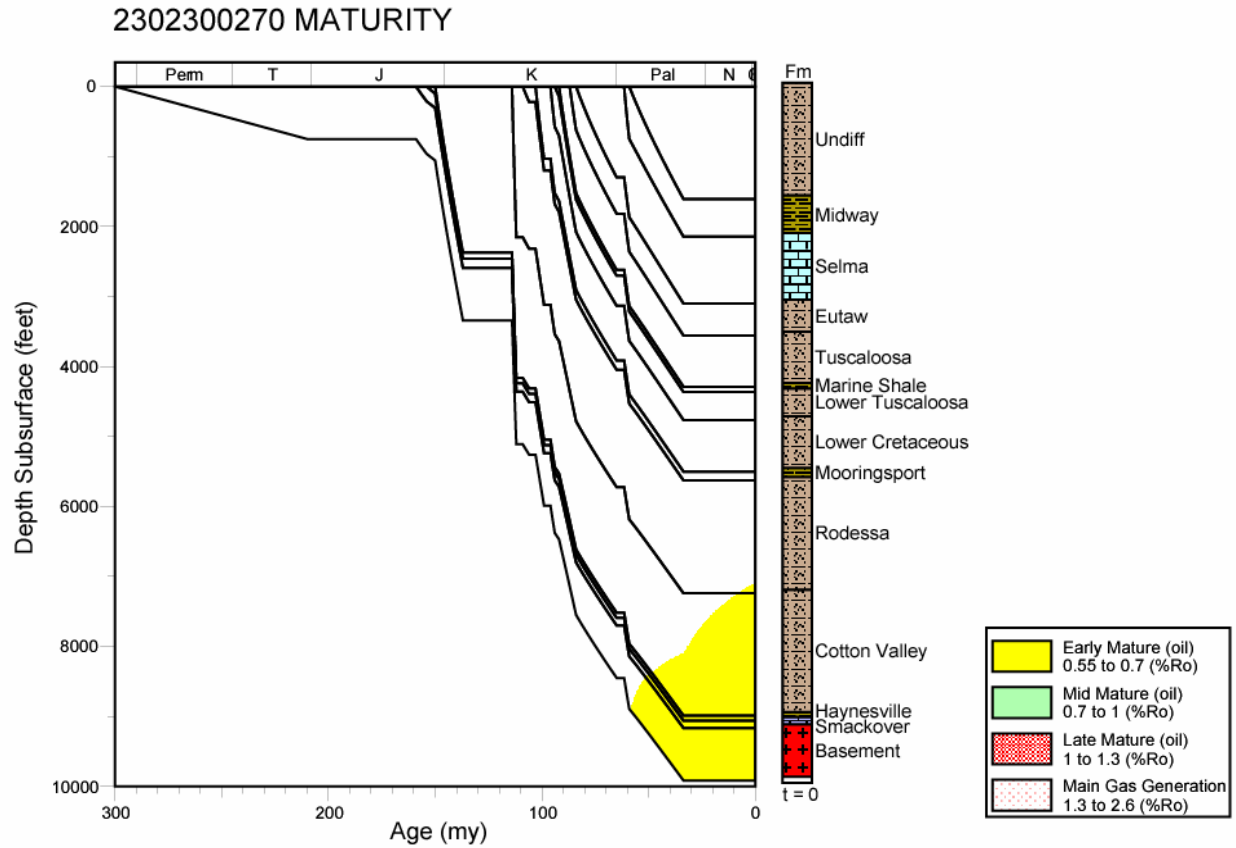


Figure 59. Thermal maturation profile for well 2302300270, Mississippi Interior Salt Basin.

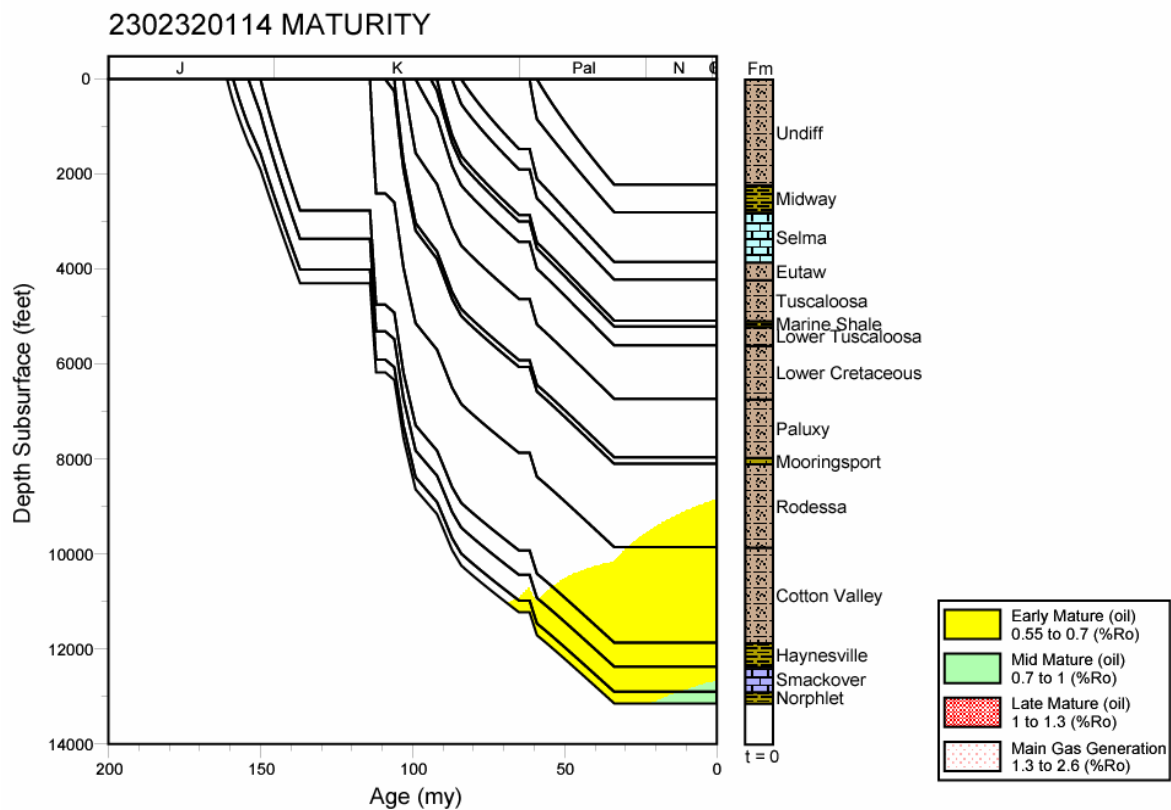


Figure 60. Thermal maturation profile for well 2302320114, Mississippi Interior Salt Basin.

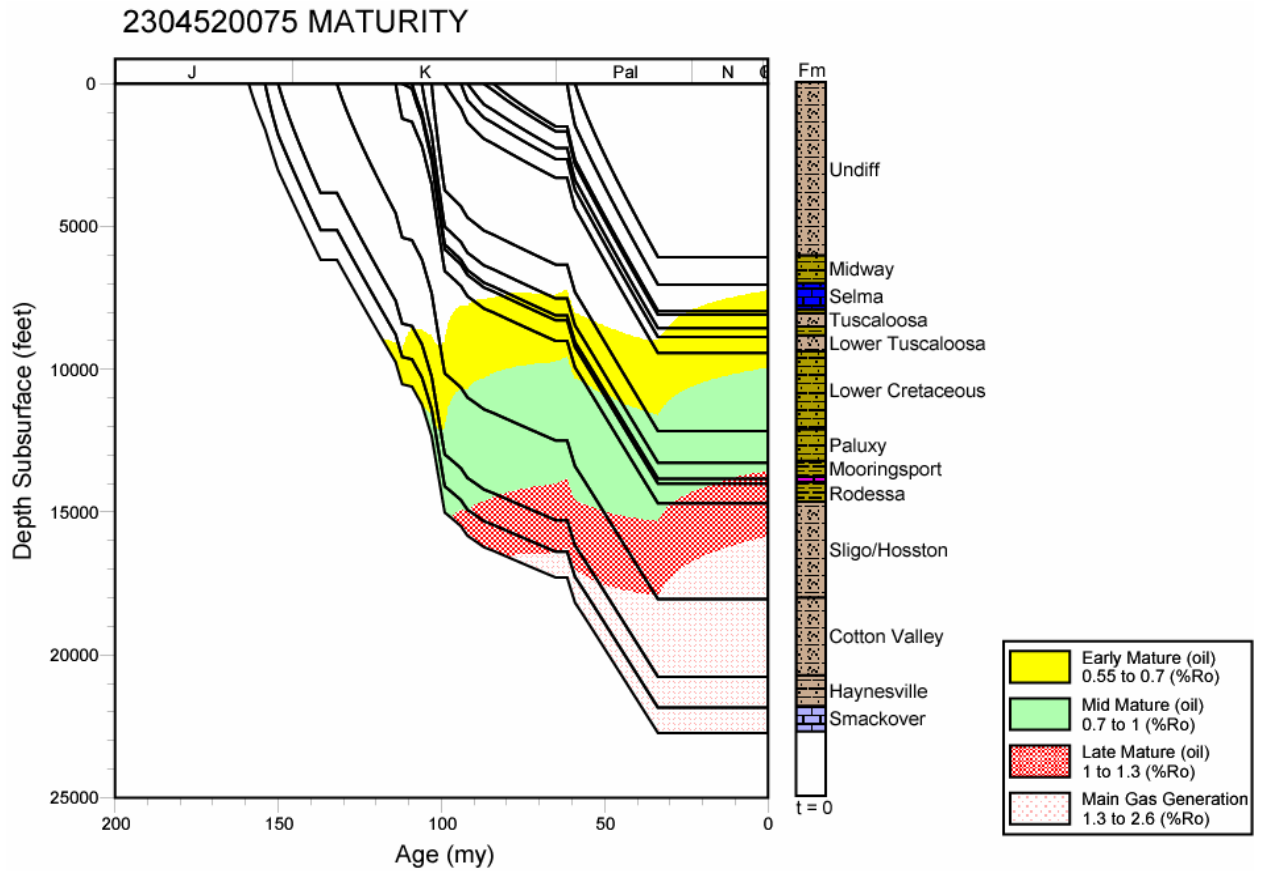


Figure 61. Thermal maturation profile for well 2304520075, Mississippi Interior Salt Basin.

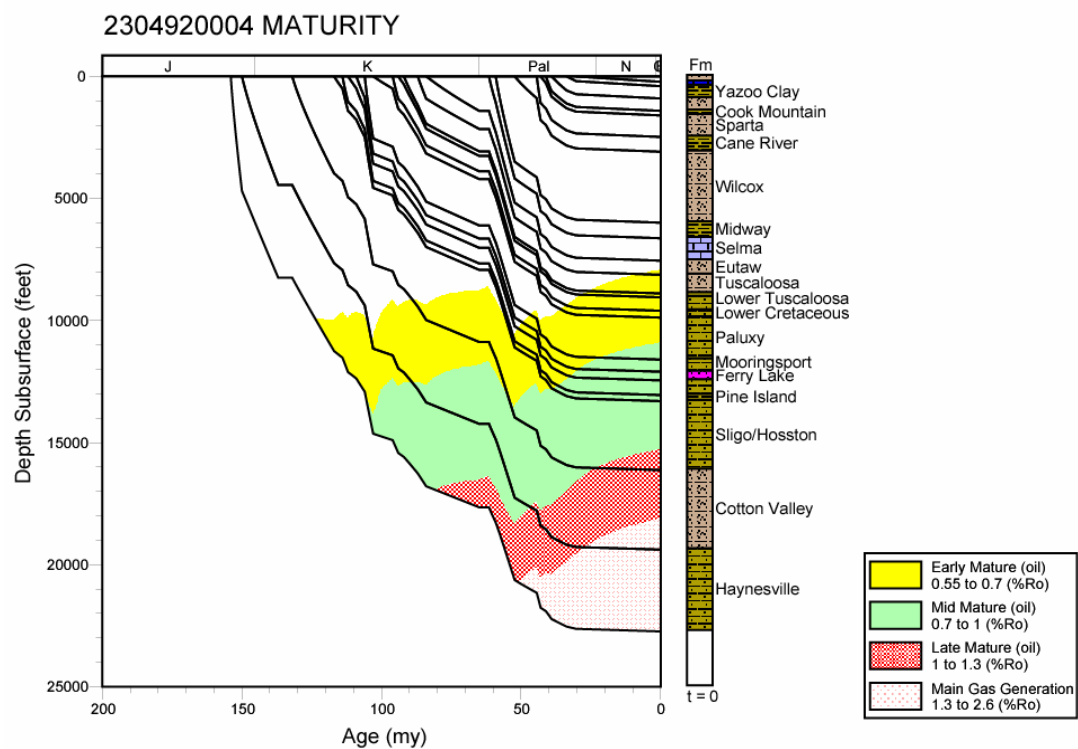


Figure 62. Thermal maturation profile for well 2304920004, Mississippi Interior Salt Basin.

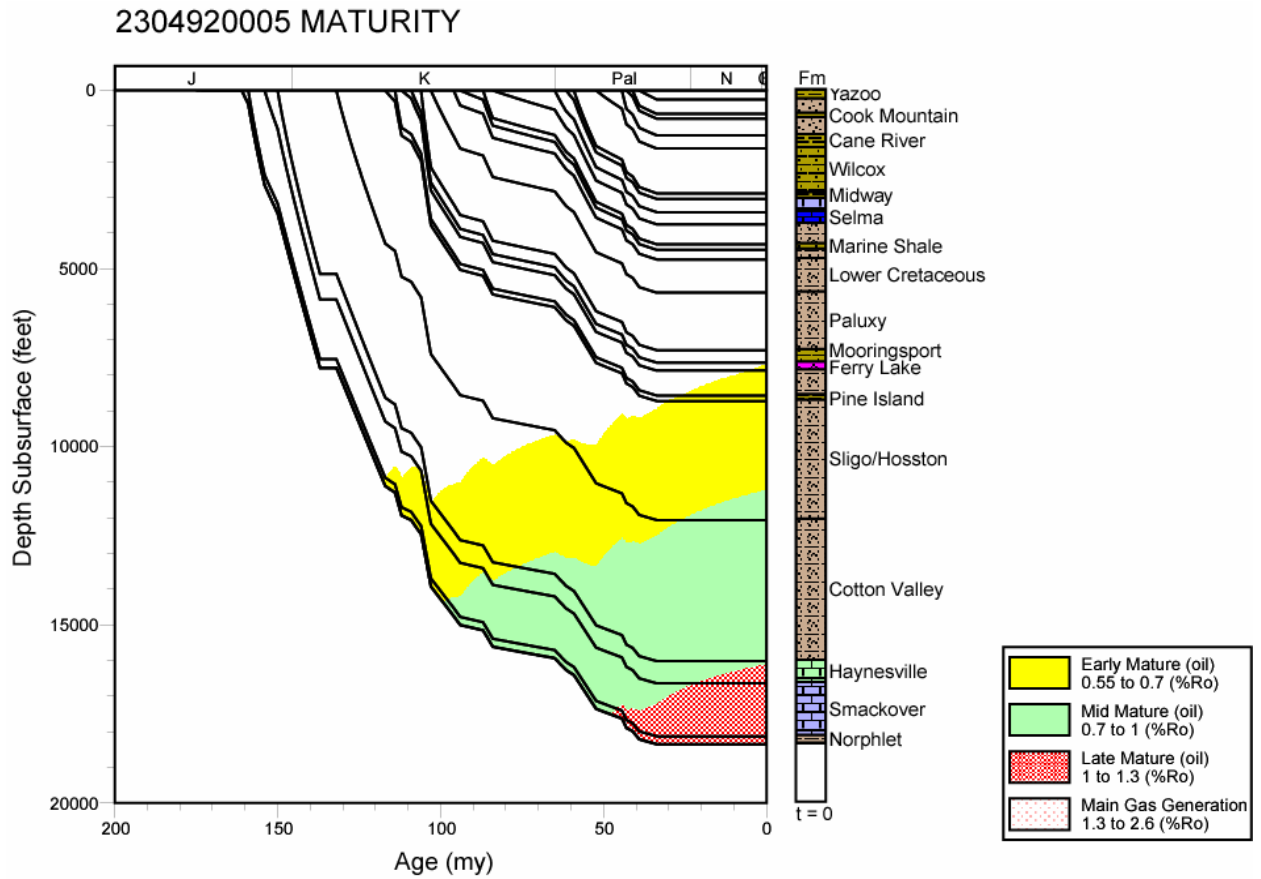


Figure 63. Thermal maturation profile for well 2304920005, Mississippi Interior Salt Basin.

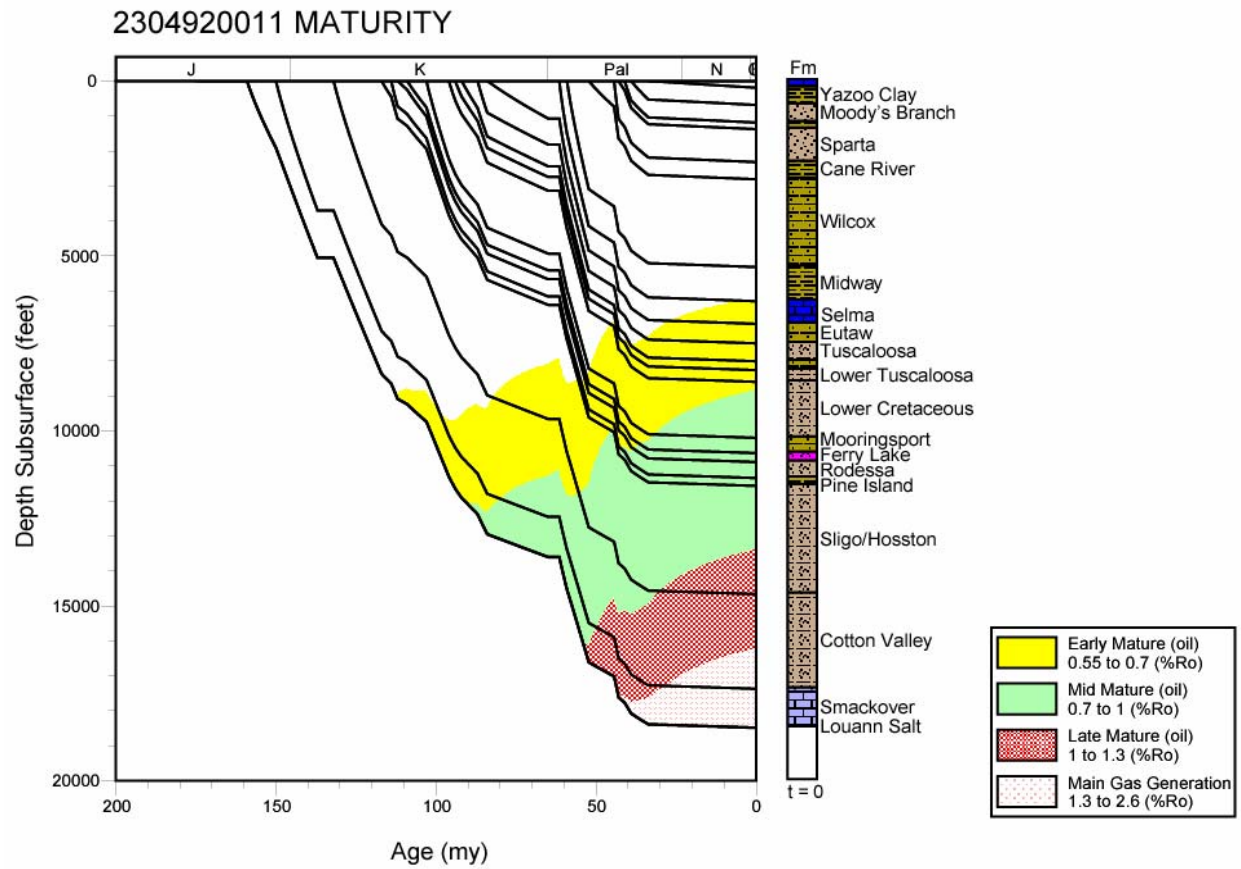


Figure 64. Thermal maturation profile for well 2304920011, Mississippi Interior Salt Basin.



## 2304920032 MATURITY

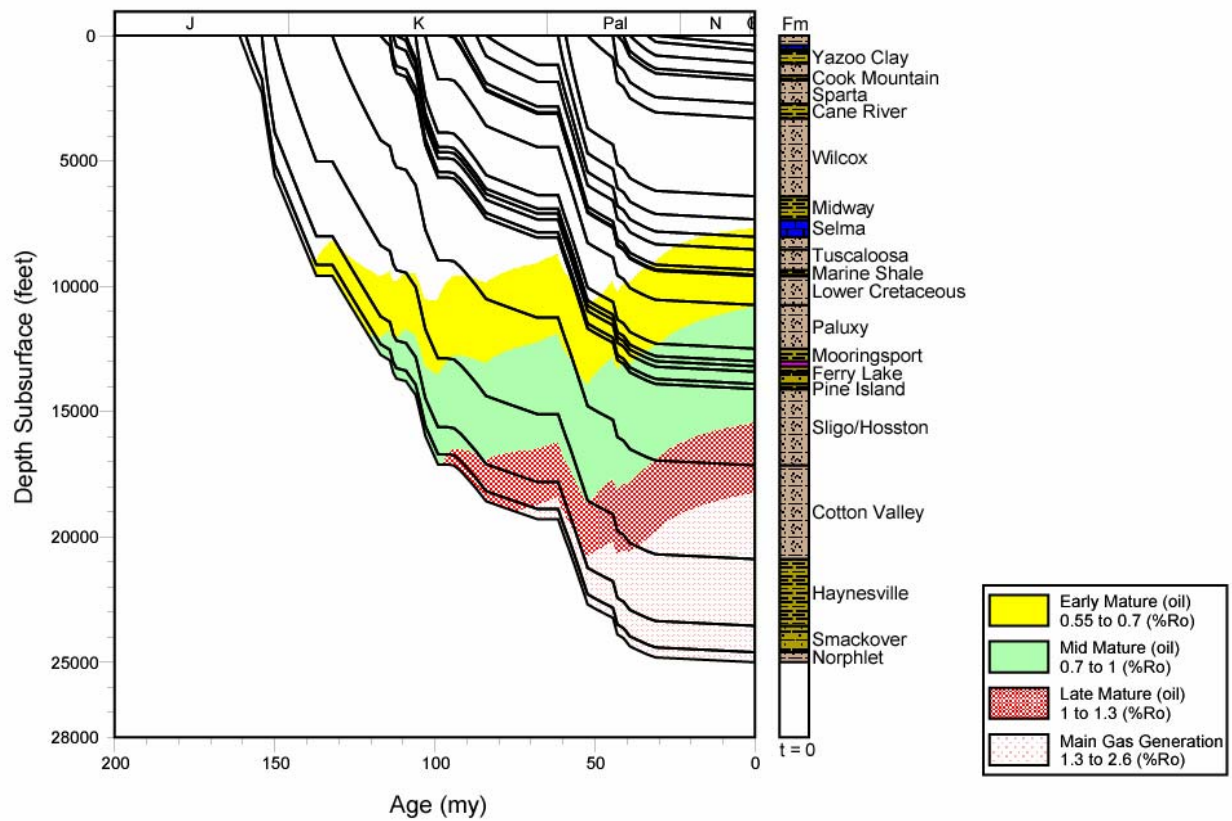


Figure 65. Thermal maturation profile for well 2304920032, Mississippi Interior Salt Basin.

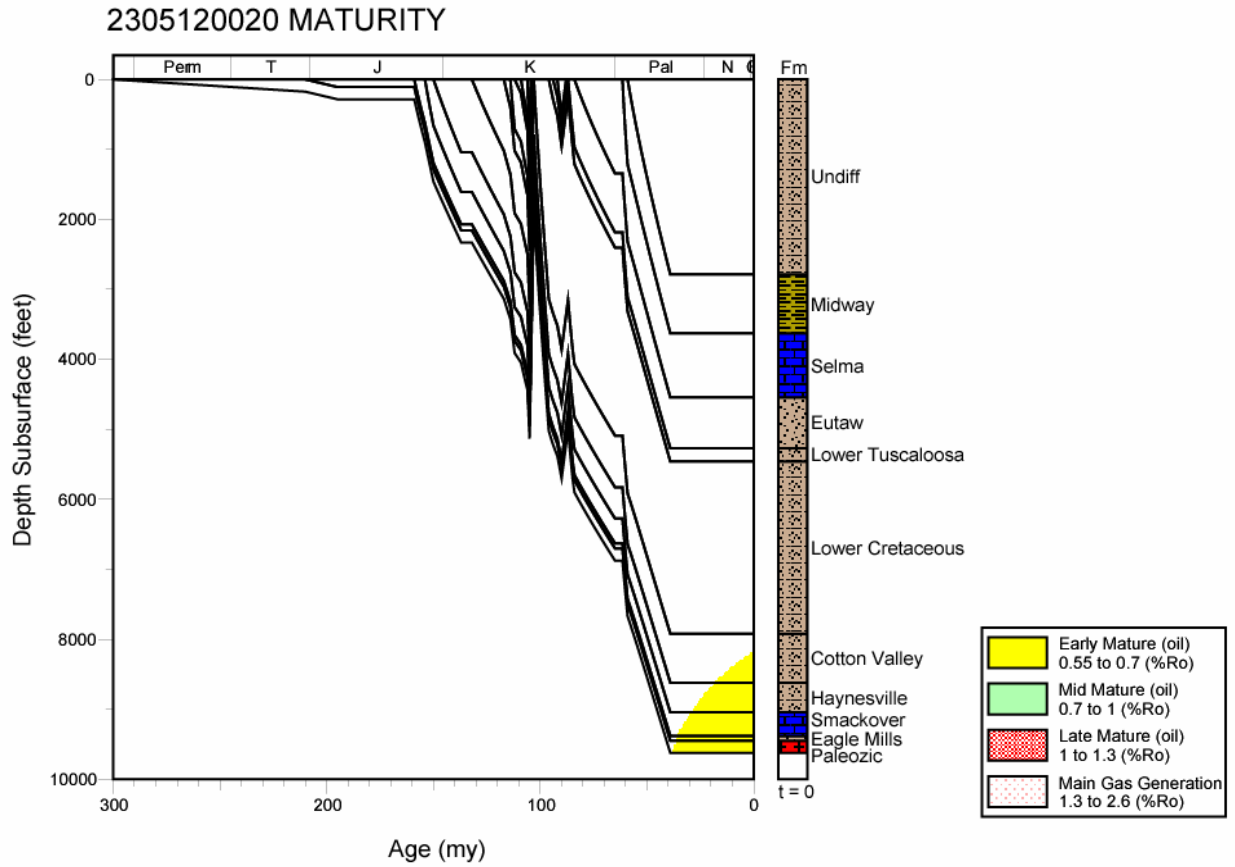


Figure 66. Thermal maturation profile for well 2305120020, Mississippi Interior Salt Basin.

2305120036 MATURITY

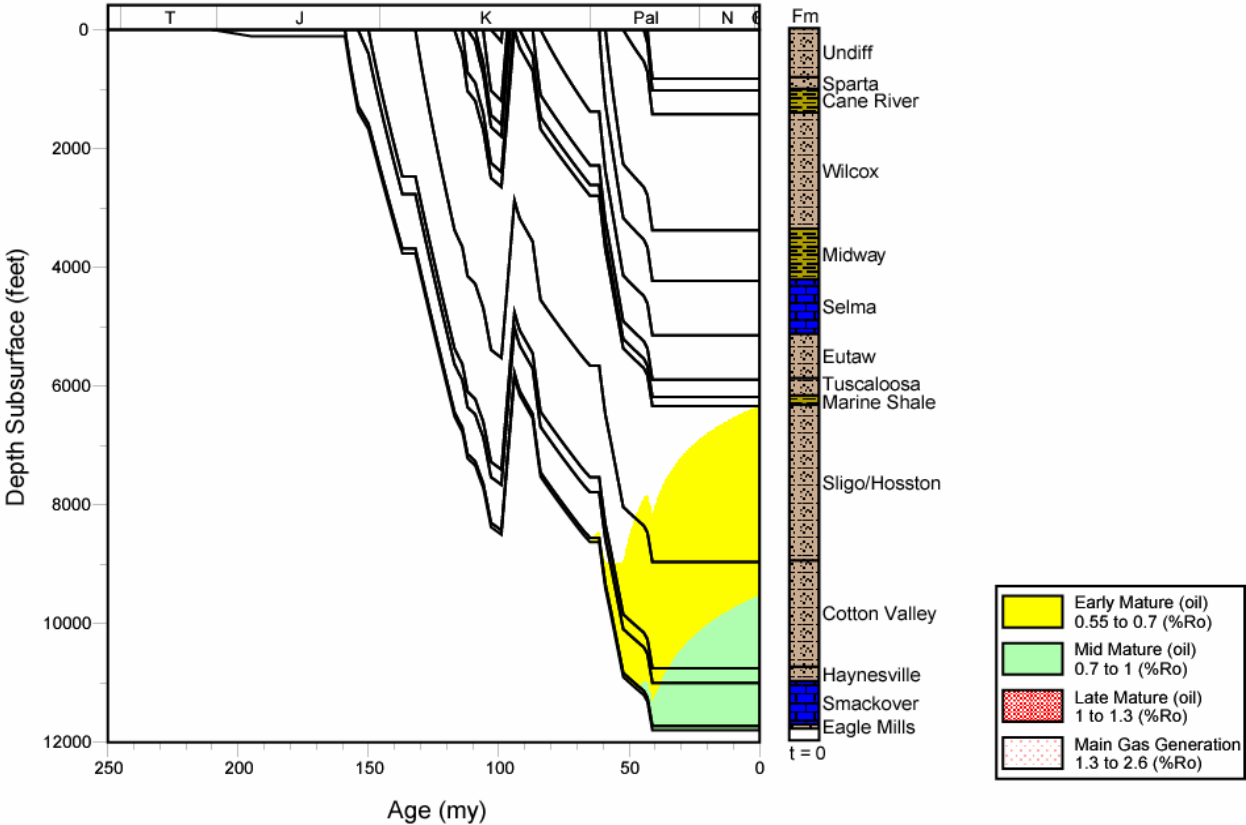


Figure 67. Thermal maturation profile for well 2305120036, Mississippi Interior Salt Basin.

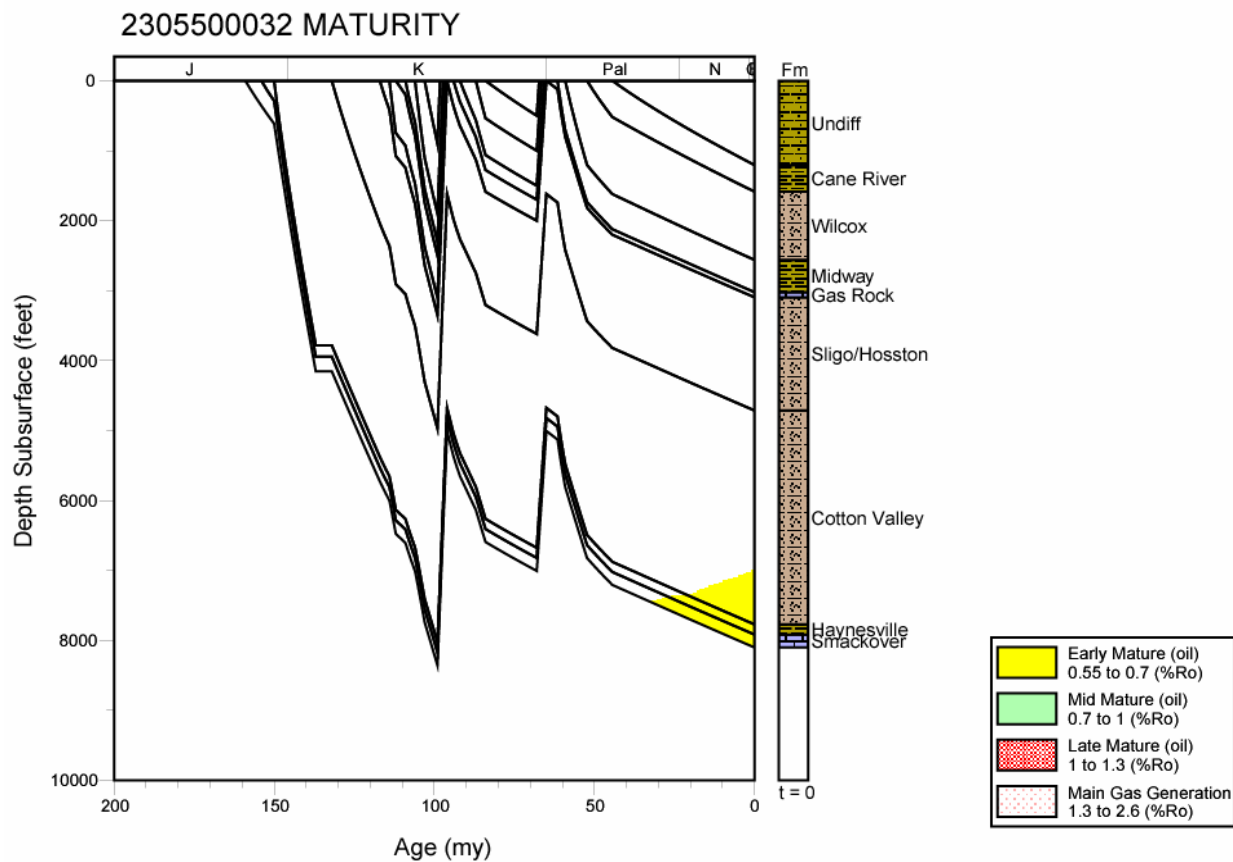


Figure 68. Thermal maturation profile for well 2305500032, Mississippi Interior Salt Basin.

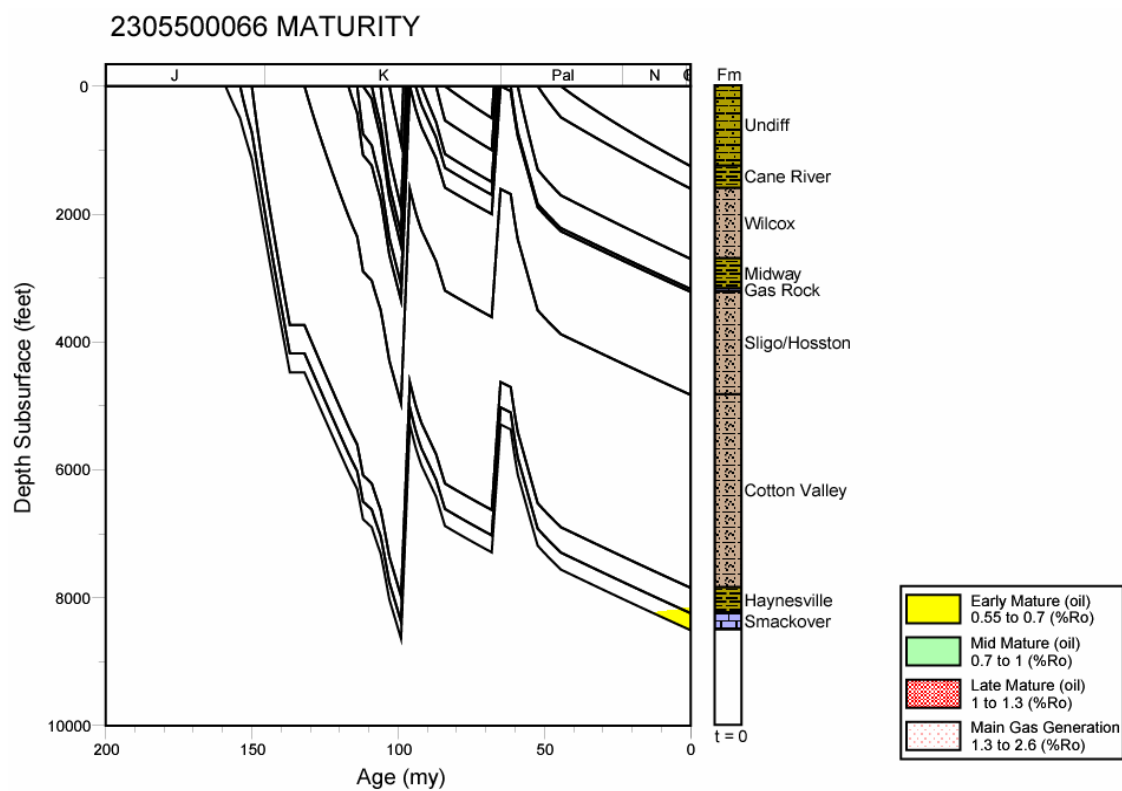


Figure 69. Thermal maturation profile for well 2305500066, Mississippi Interior Salt Basin.

# 2306120028 MATURITY

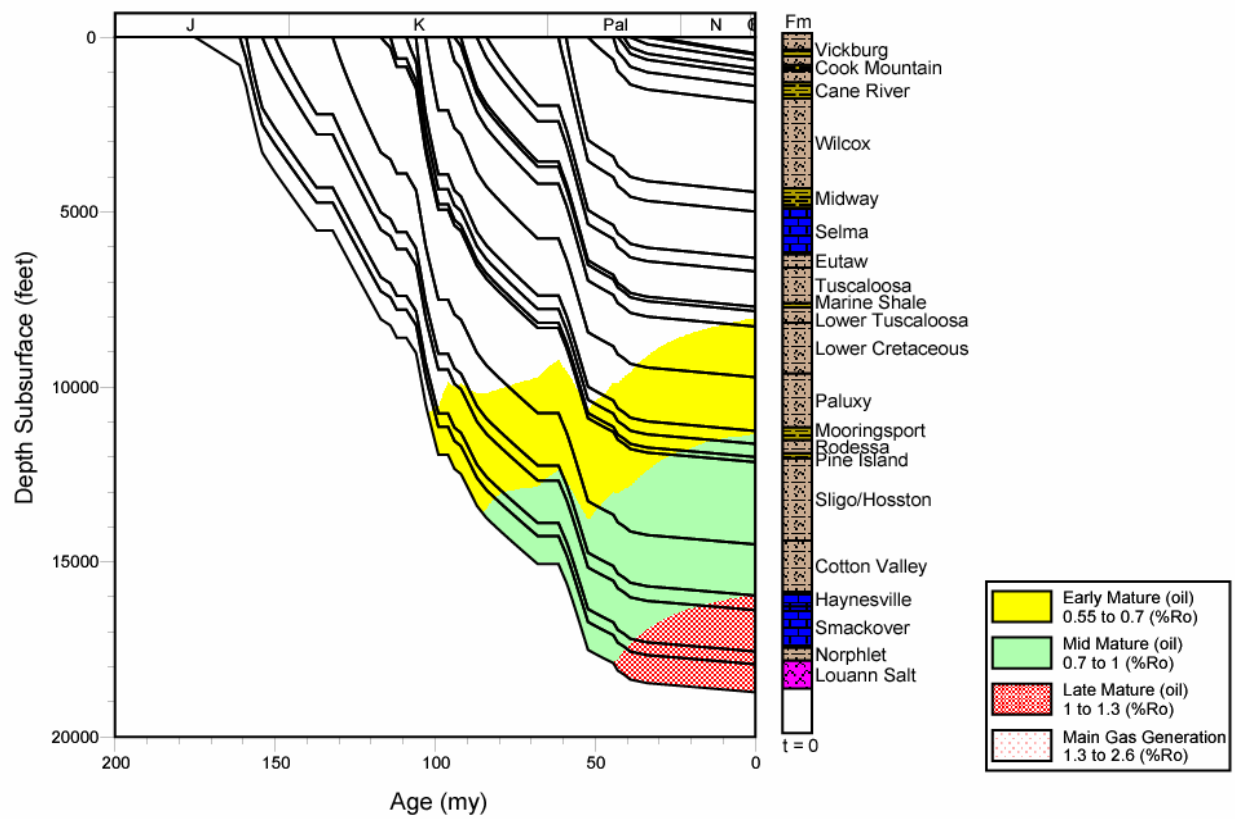


Figure 70. Thermal maturation profile for well 2306120028, Mississippi Interior Salt Basin.

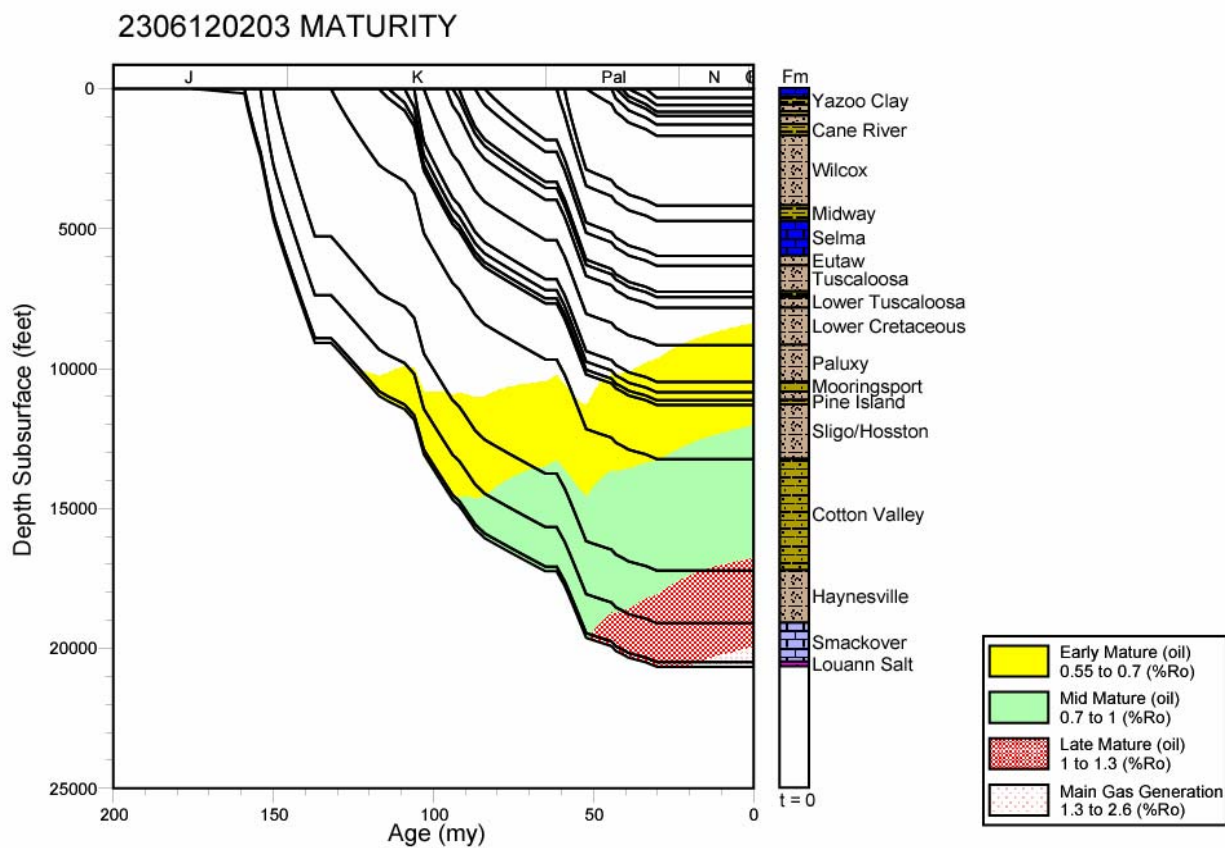


Figure 71. Thermal maturation profile for well 2306120203, Mississippi Interior Salt Basin.

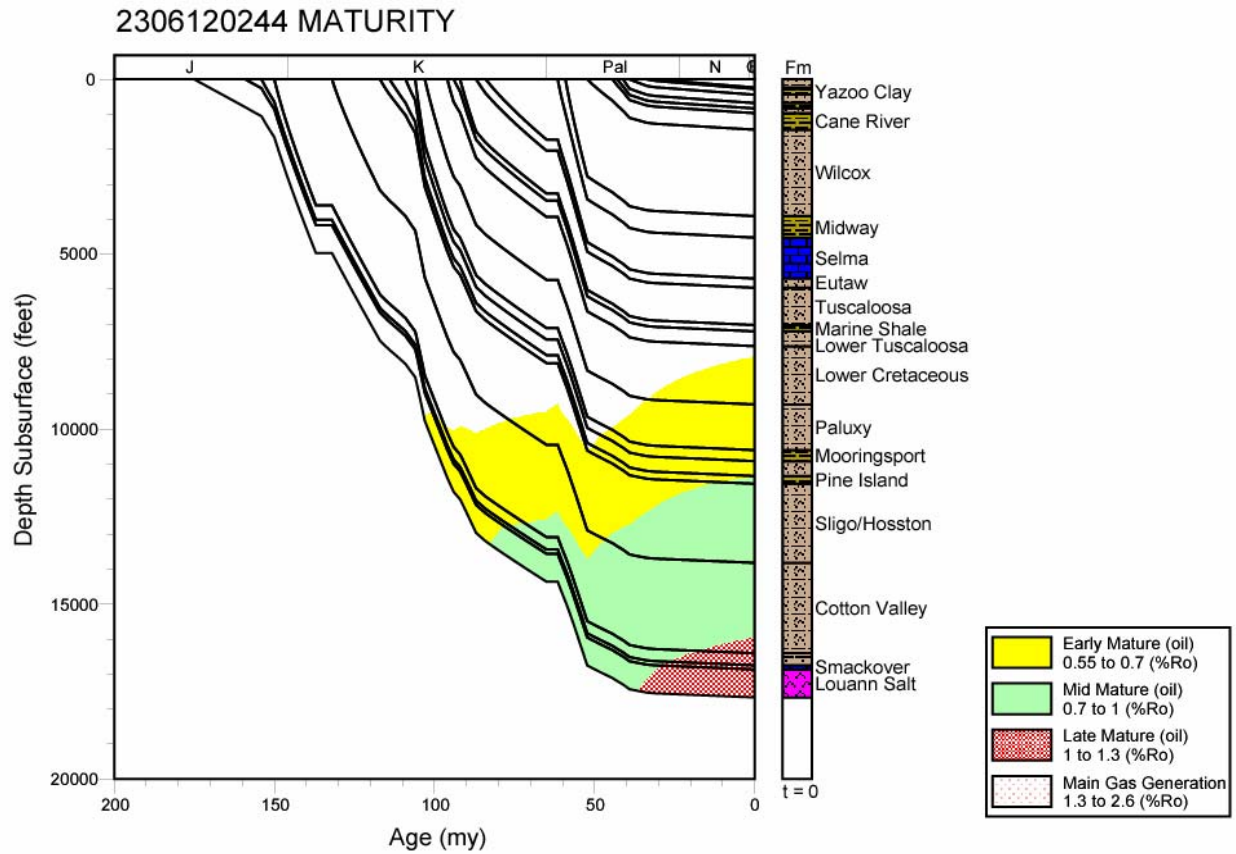


Figure 72. Thermal maturation profile for well 2306120244, Mississippi Interior Salt Basin.



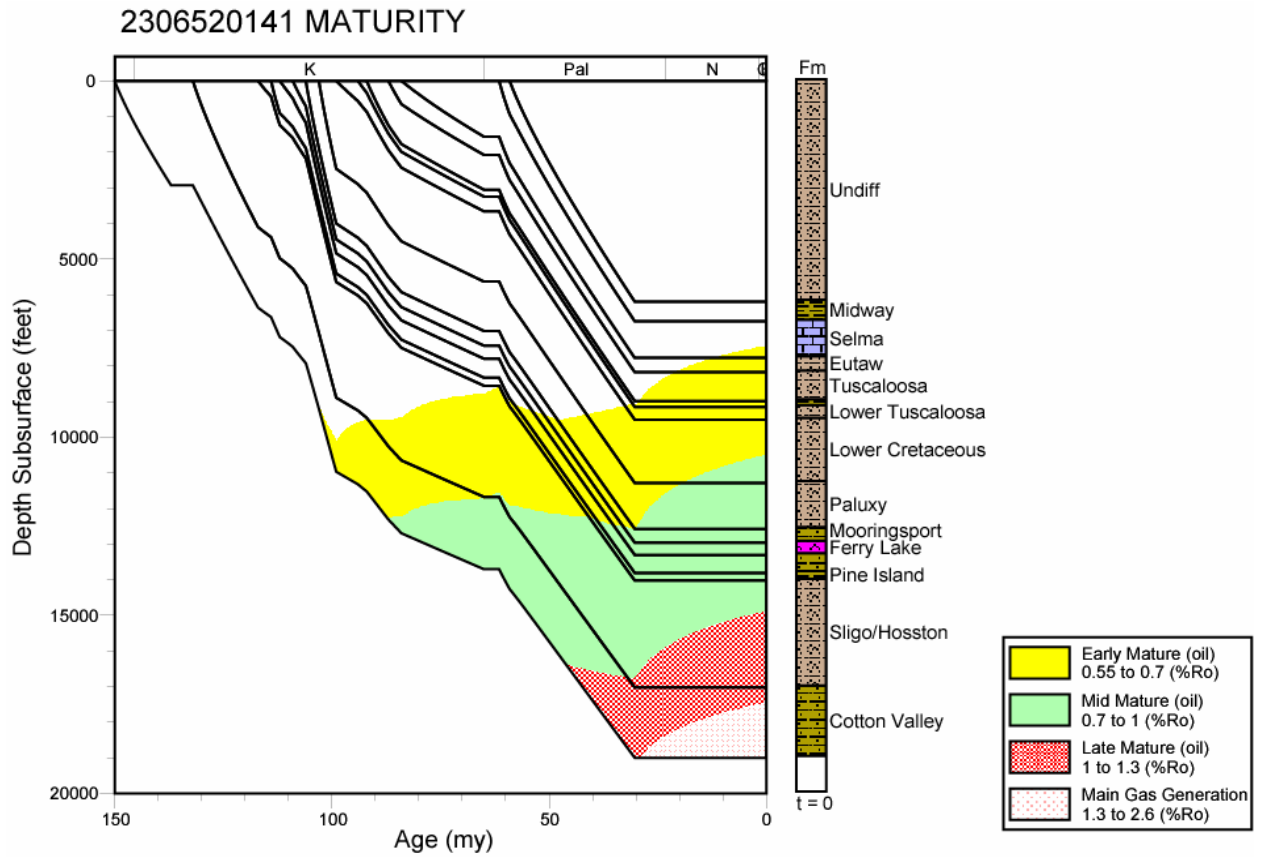


Figure 73. Thermal maturation profile for well 2306520141, Mississippi Interior Salt Basin.

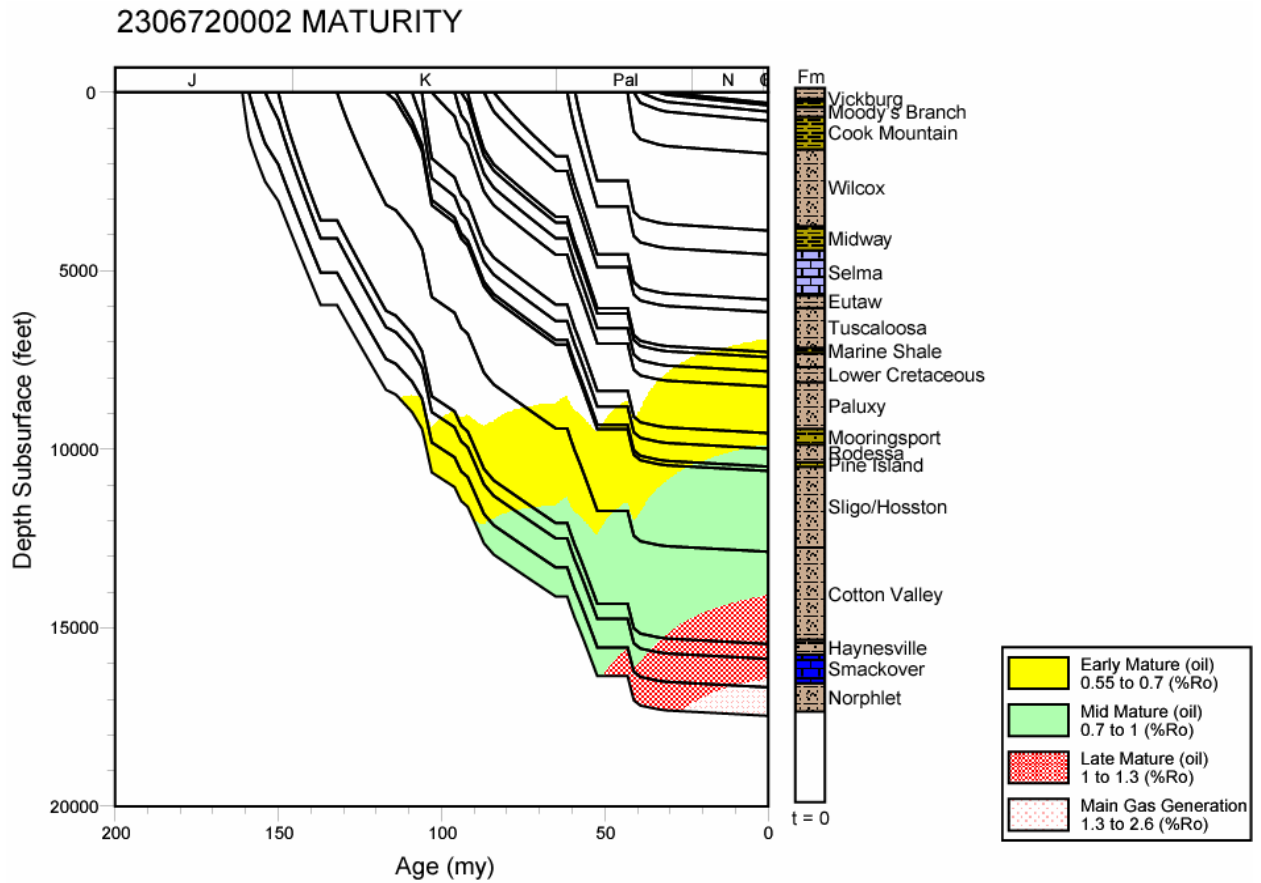


Figure 74. Thermal maturation profile for well 2306720002, Mississippi Interior Salt Basin.

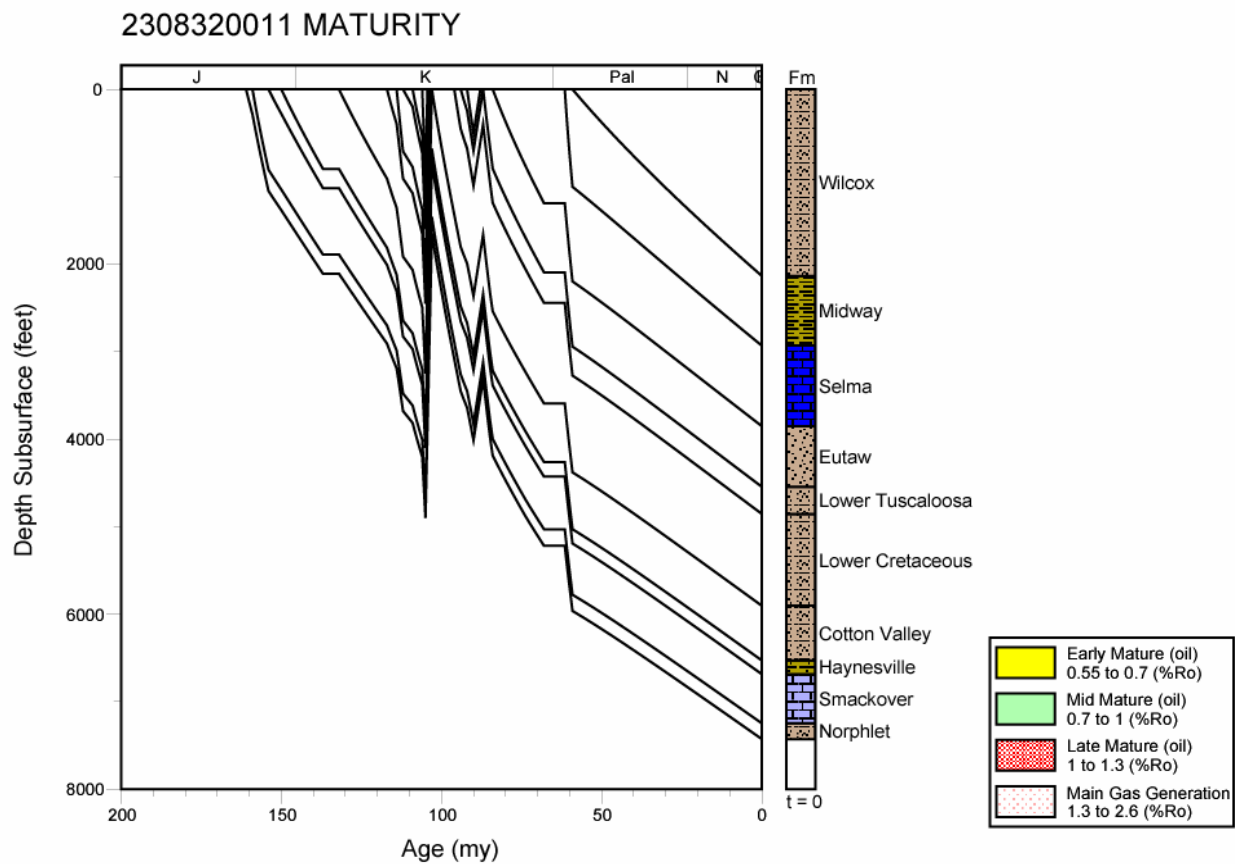


Figure 75. Thermal maturation profile for well 2308320011, Mississippi Interior Salt Basin.

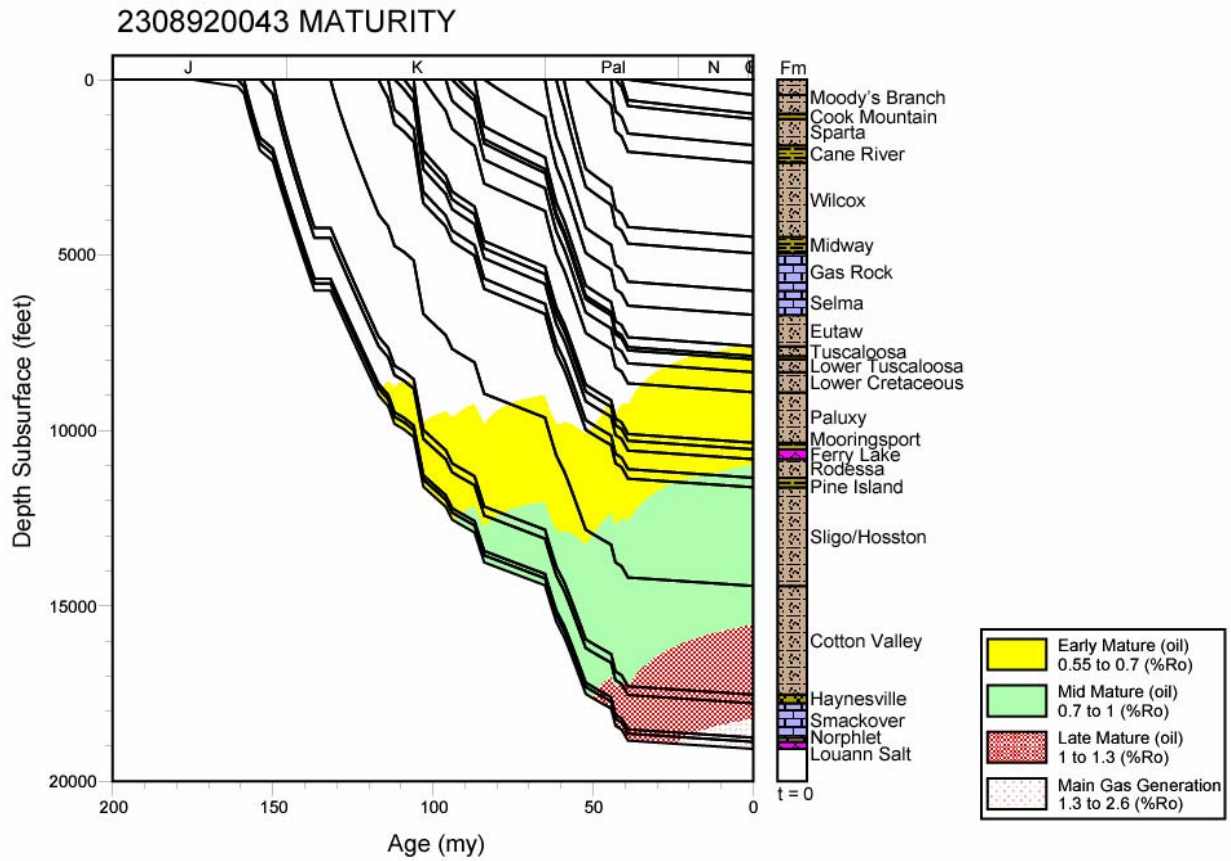


Figure 76. Thermal maturation profile for well 2308920043, Mississippi Interior Salt Basin.

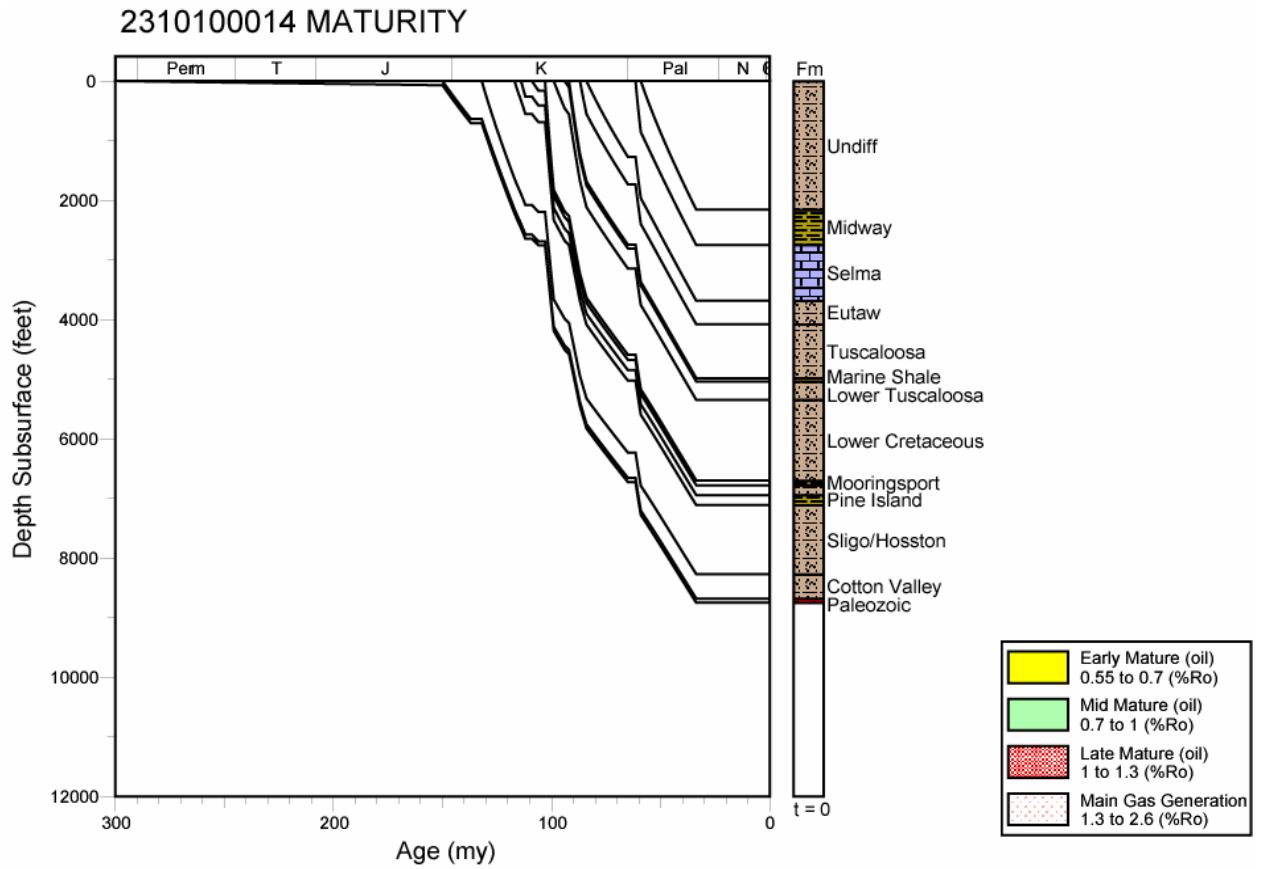


Figure 77. Thermal maturation profile for well 2310100014, Mississippi Interior Salt Basin.

# 2310120005 MATURITY

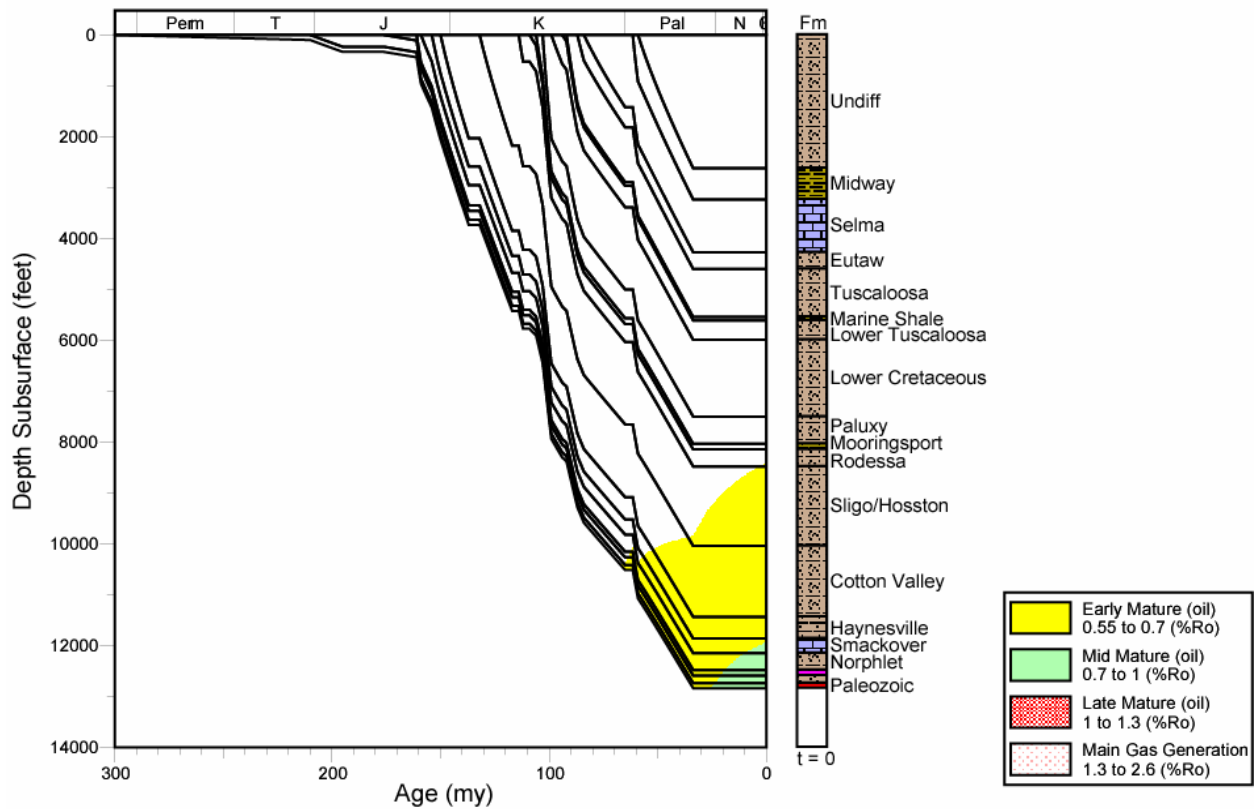


Figure 78. Thermal maturation profile for well 2310120005, Mississippi Interior Salt Basin.

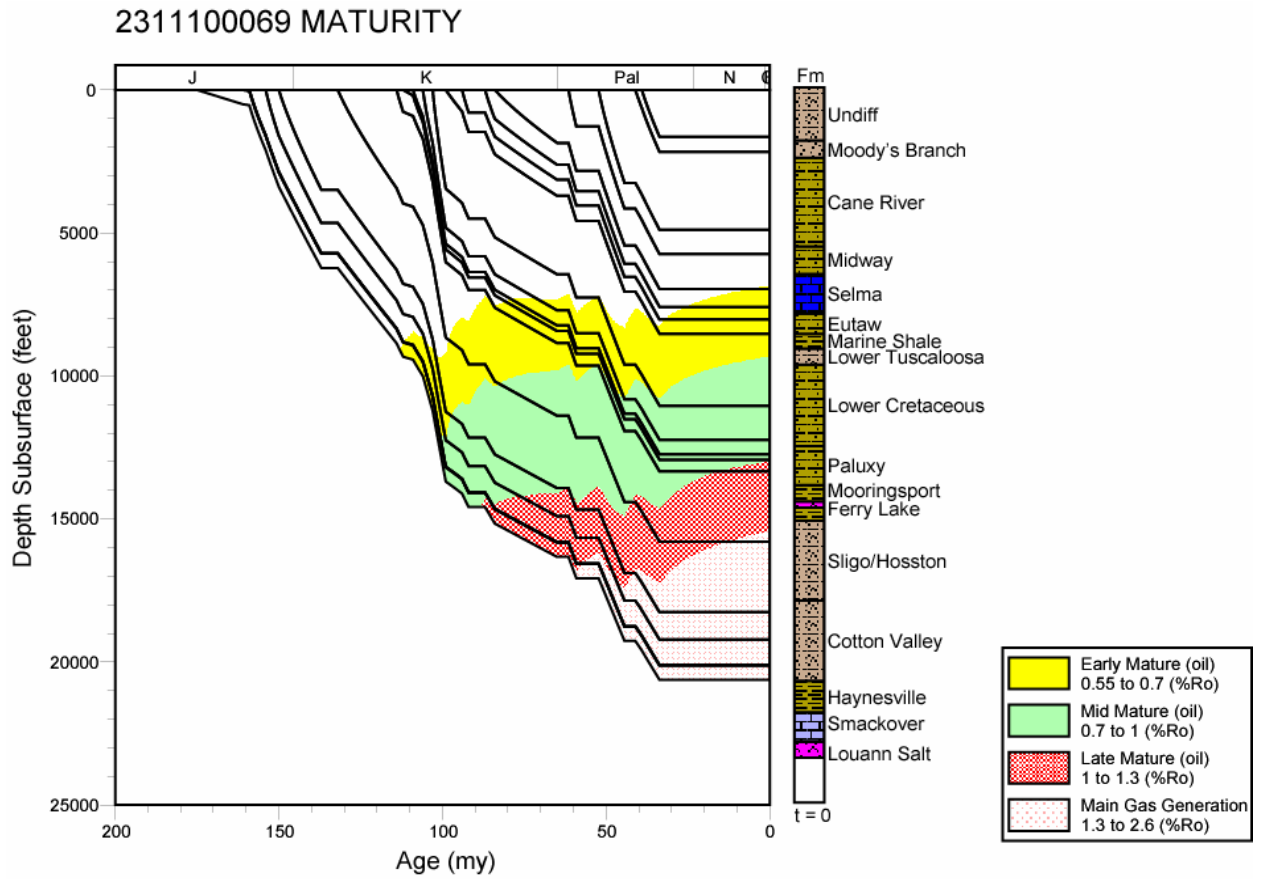


Figure 79. Thermal maturation profile for well 2311100069, Mississippi Interior Salt Basin.

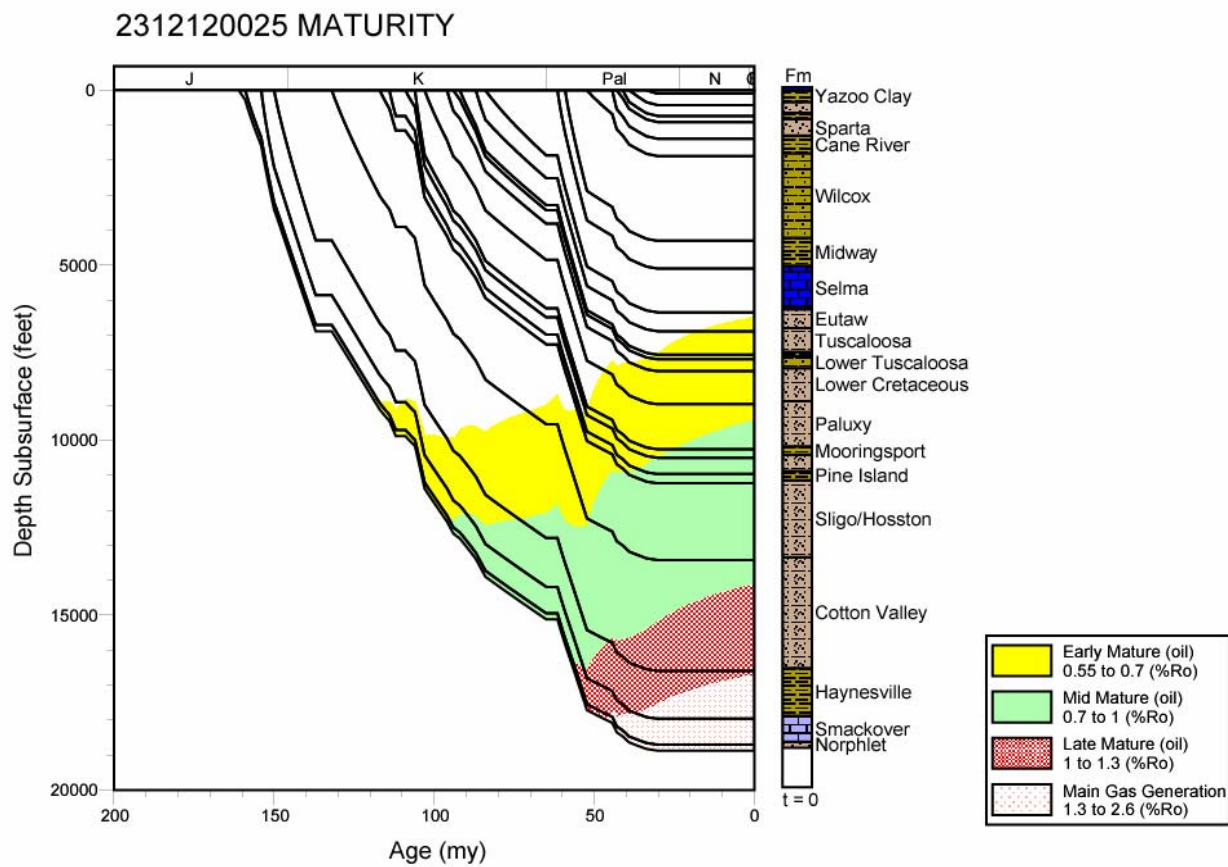


Figure 80. Thermal maturation profile for well 2312120025, Mississippi Interior Salt Basin.



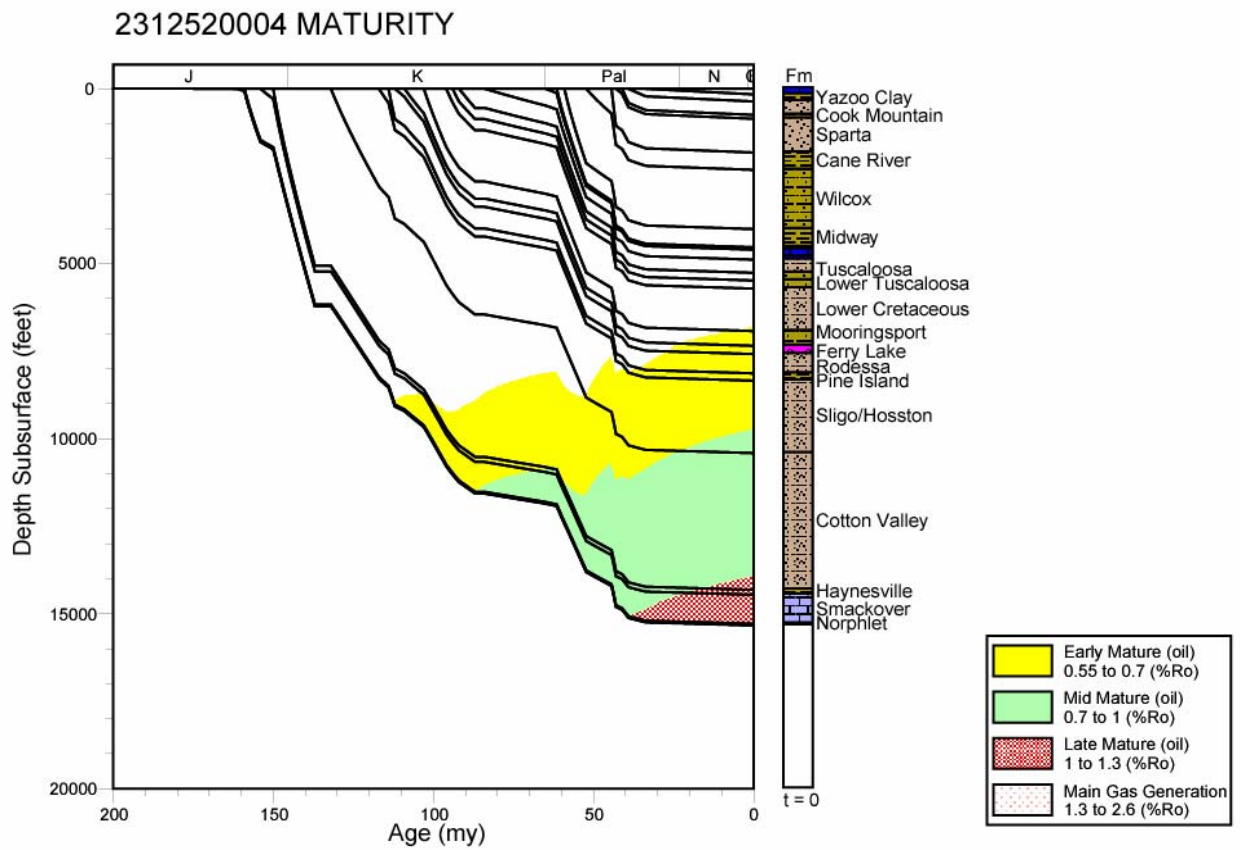


Figure 81. Thermal maturation profile for well 2312520004, Mississippi Interior Salt Basin.

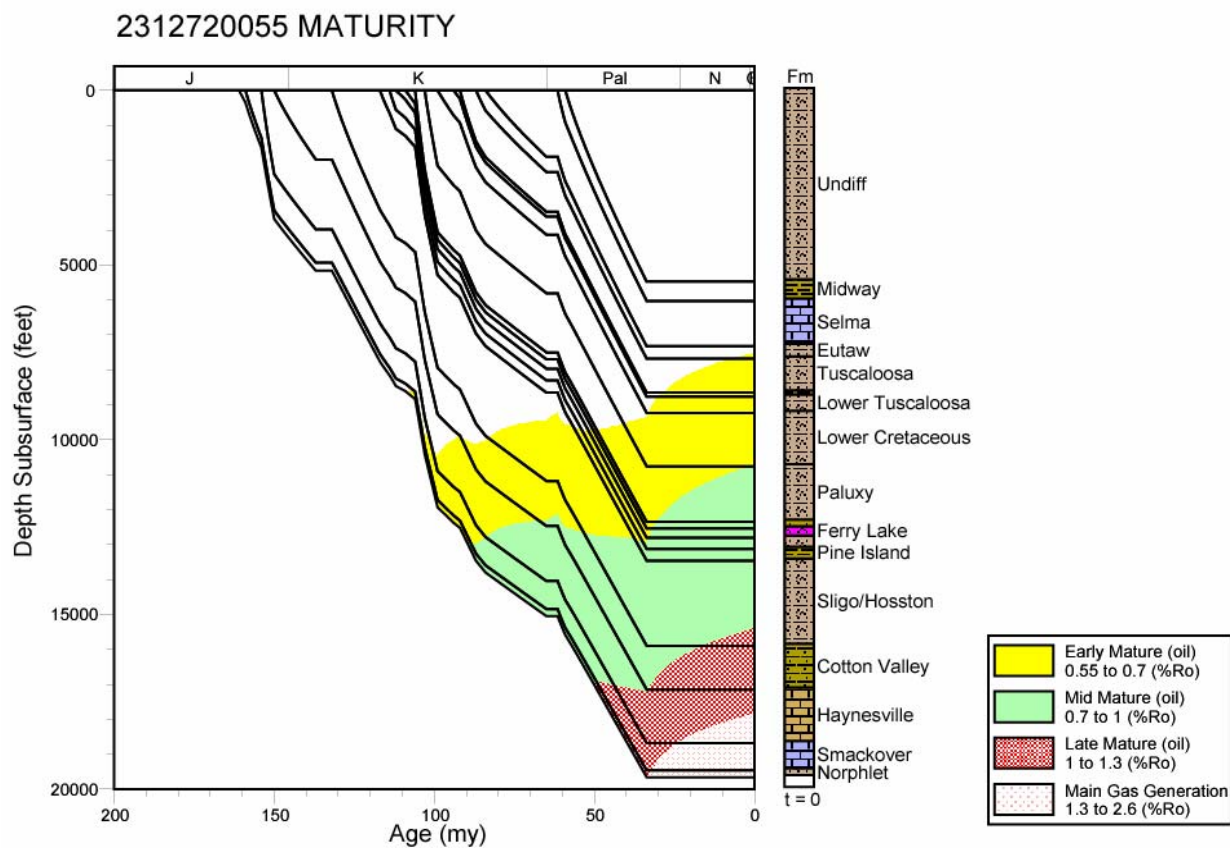


Figure 82. Thermal maturation profile for well 2312720055, Mississippi Interior Salt Basin.

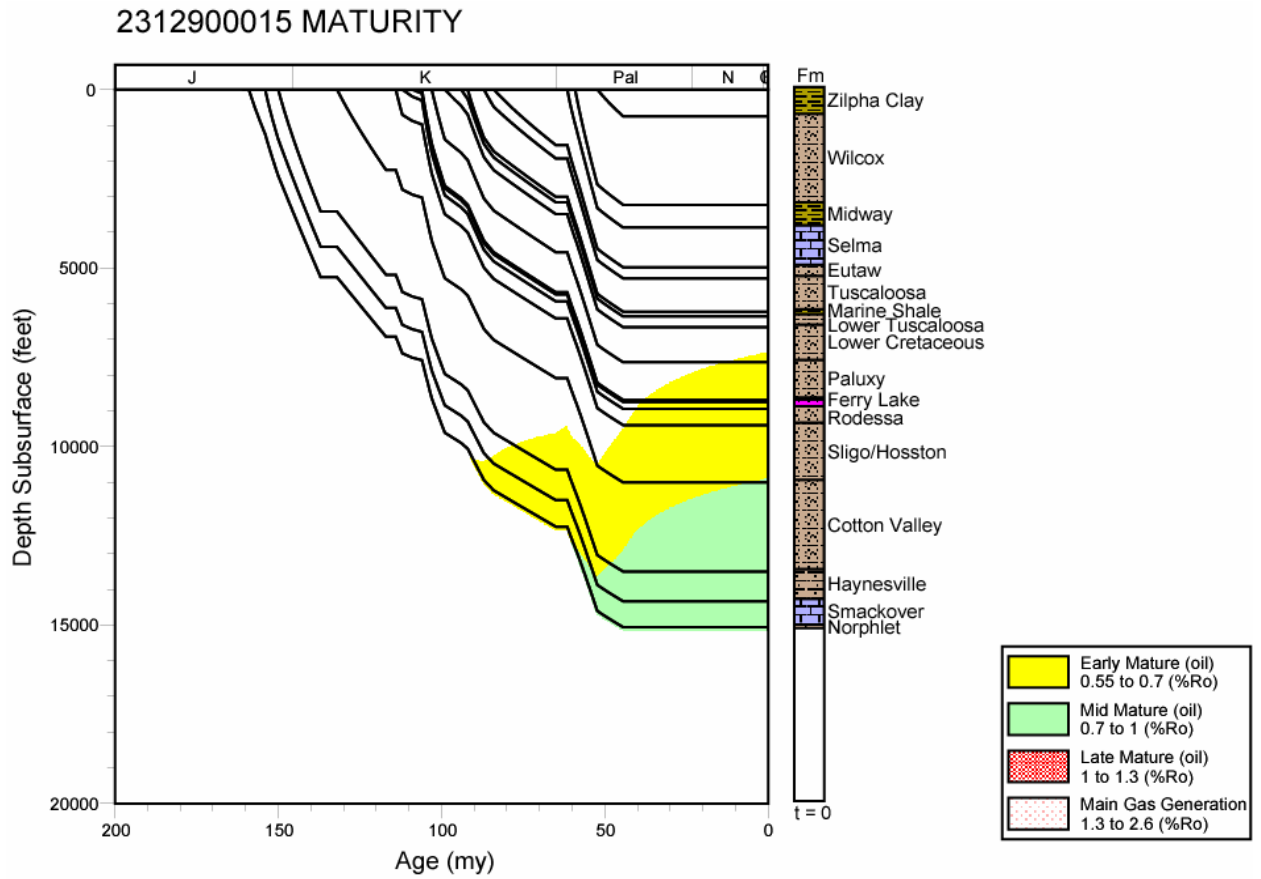


Figure 83. Thermal maturation profile for well 2312900015, Mississippi Interior Salt Basin.

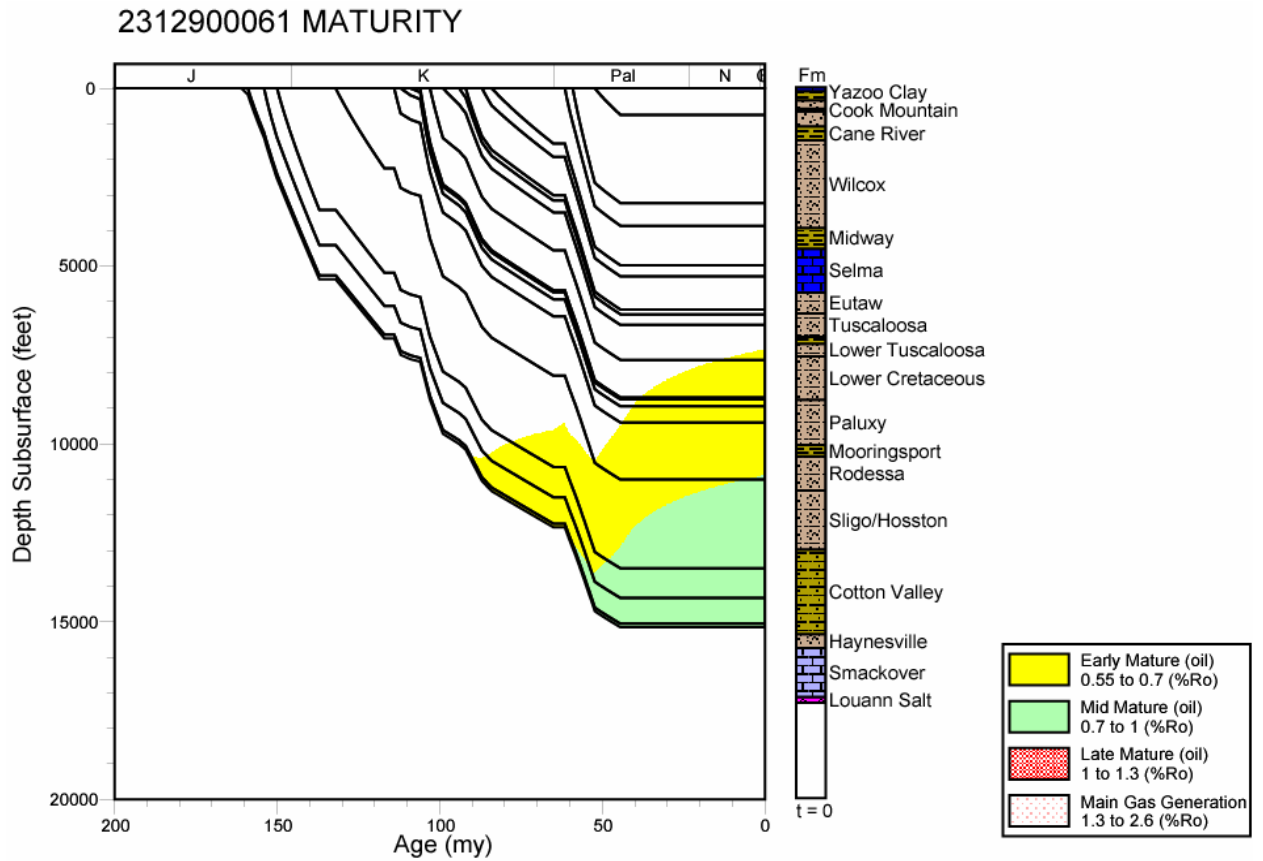


Figure 84. Thermal maturation profile for well 2312900061, Mississippi Interior Salt Basin.

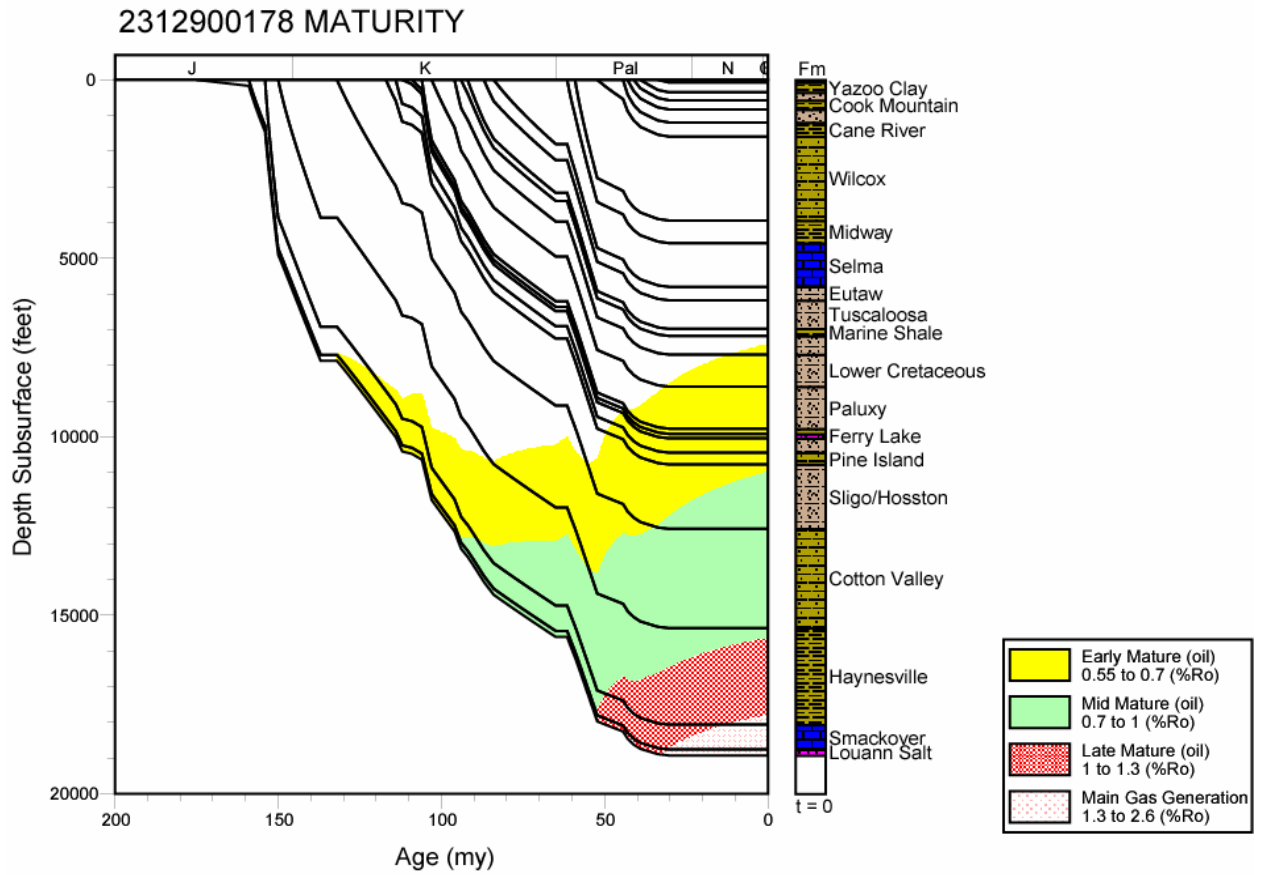


Figure 85. Thermal maturation profile for well 2312900178, Mississippi Interior Salt Basin.

# 2312920006 MATURITY

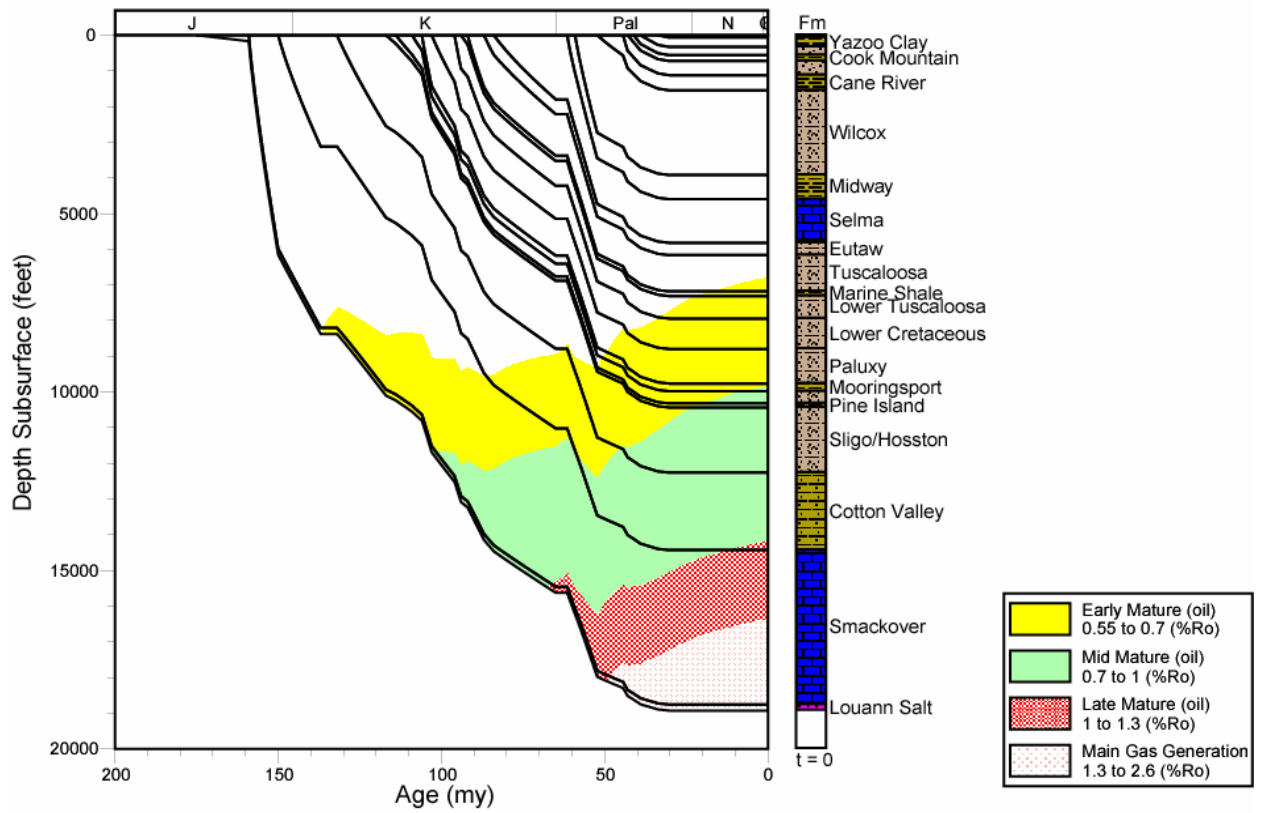


Figure 86. Thermal maturation profile for well 2312920006, Mississippi Interior Salt Basin.

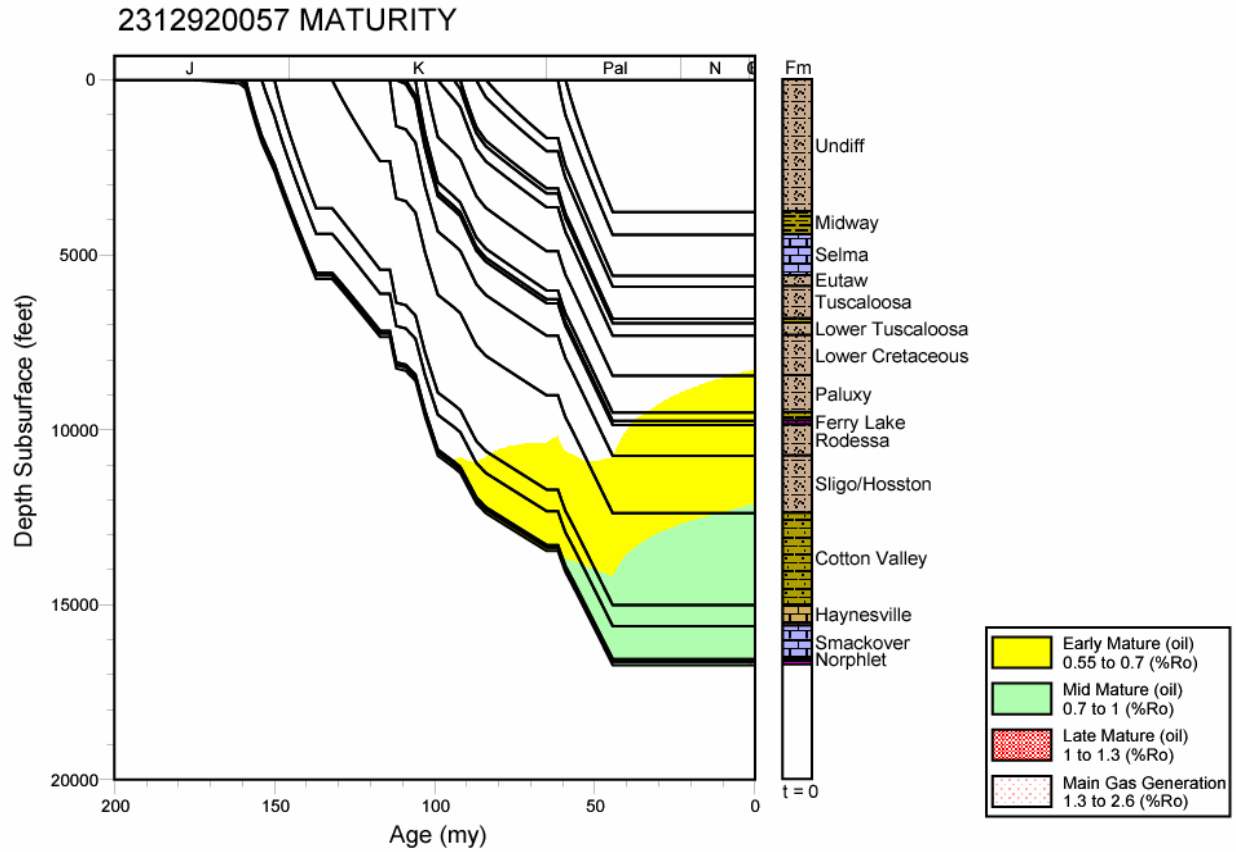


Figure 87. Thermal maturation profile for well 2312920057, Mississippi Interior Salt Basin.

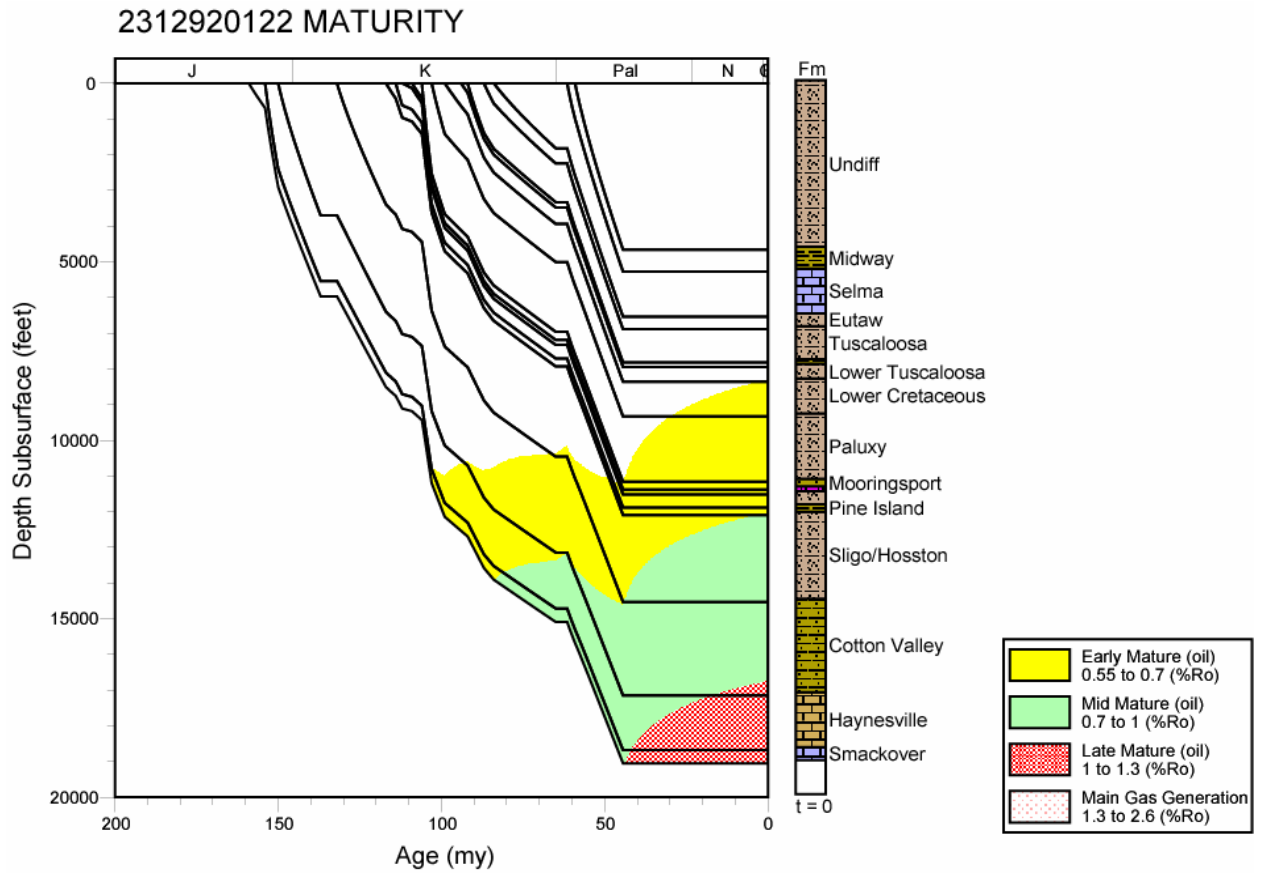


Figure 88. Thermal maturation profile for well 2312920122, Mississippi Interior Salt Basin.



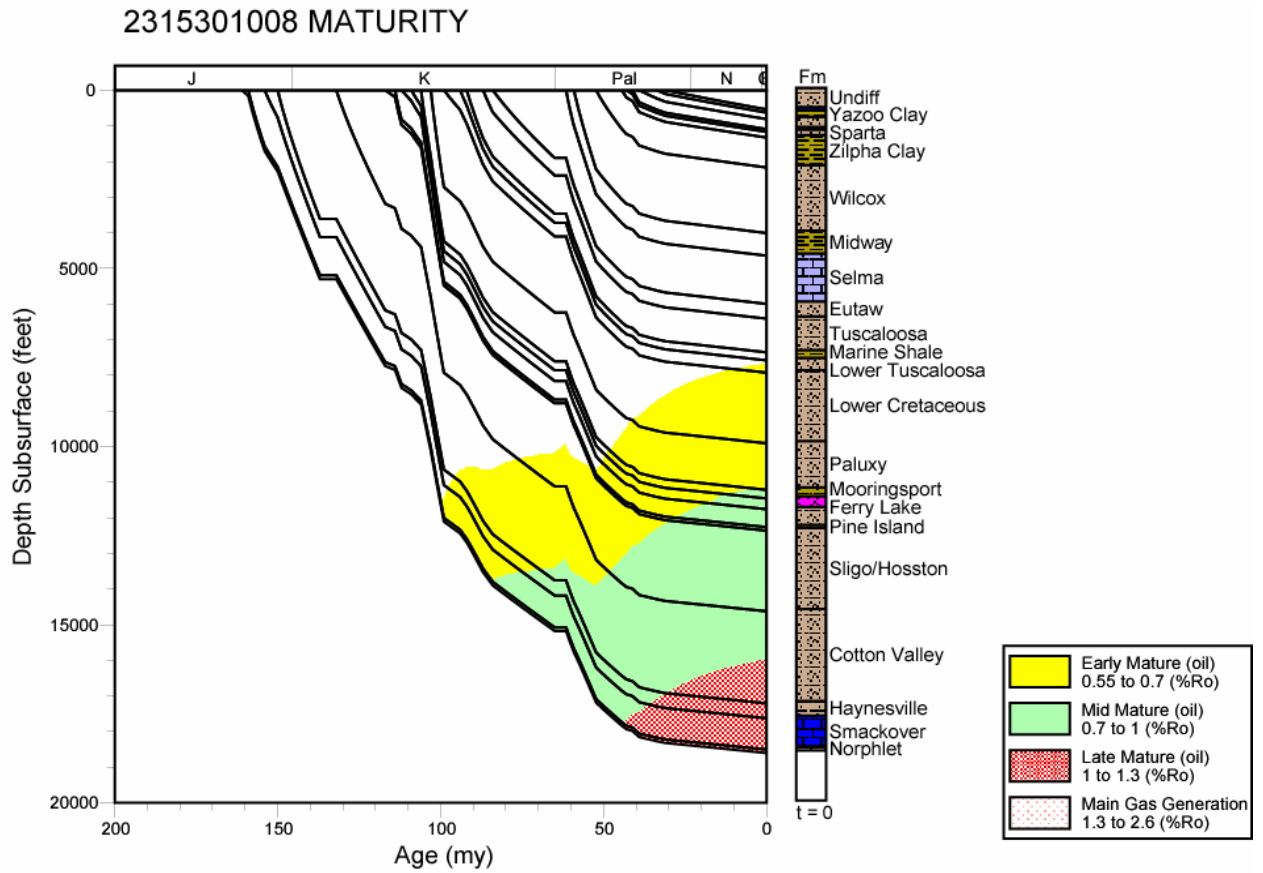


Figure 89. Thermal maturation profile for well 2315301008, Mississippi Interior Salt Basin.

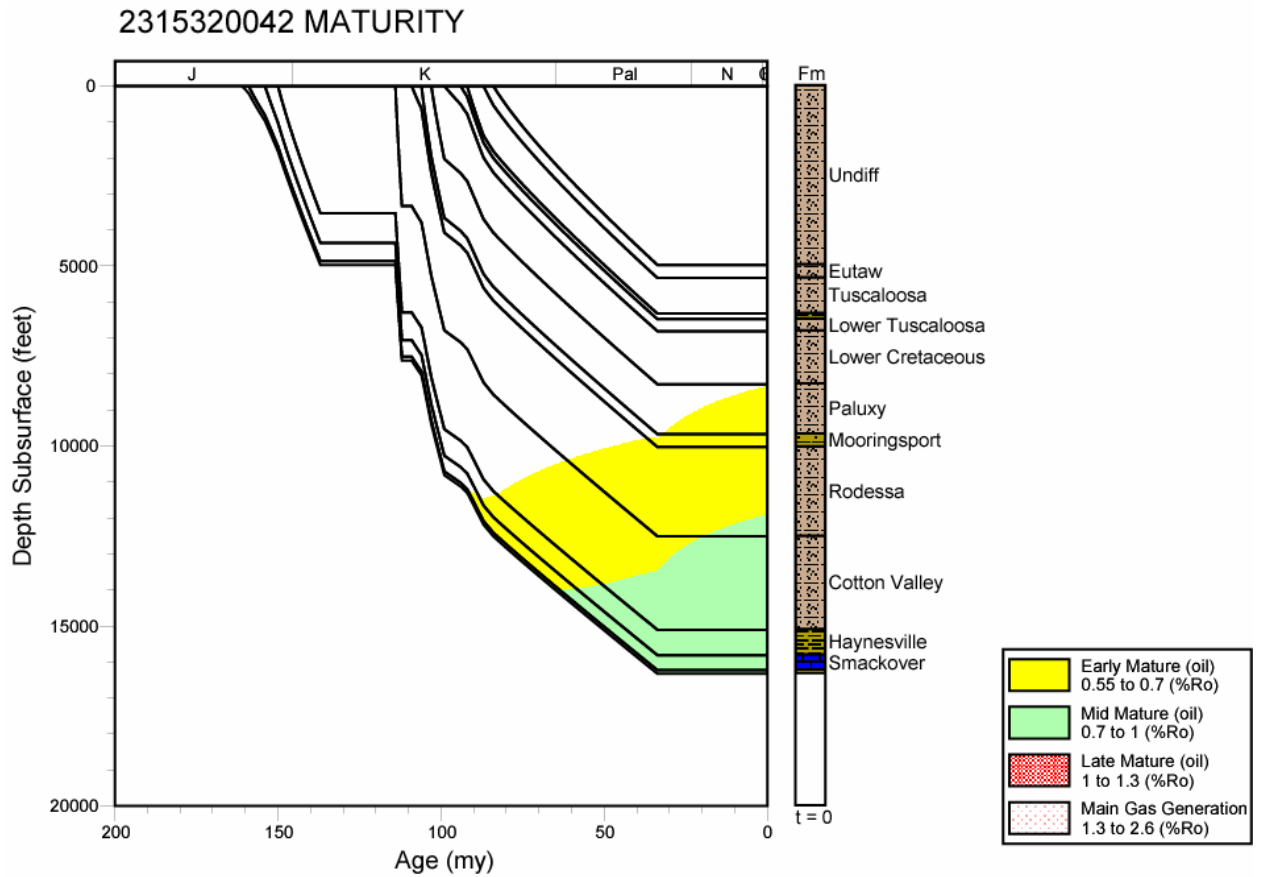


Figure 90. Thermal maturation profile for well 2315320042, Mississippi Interior Salt Basin.

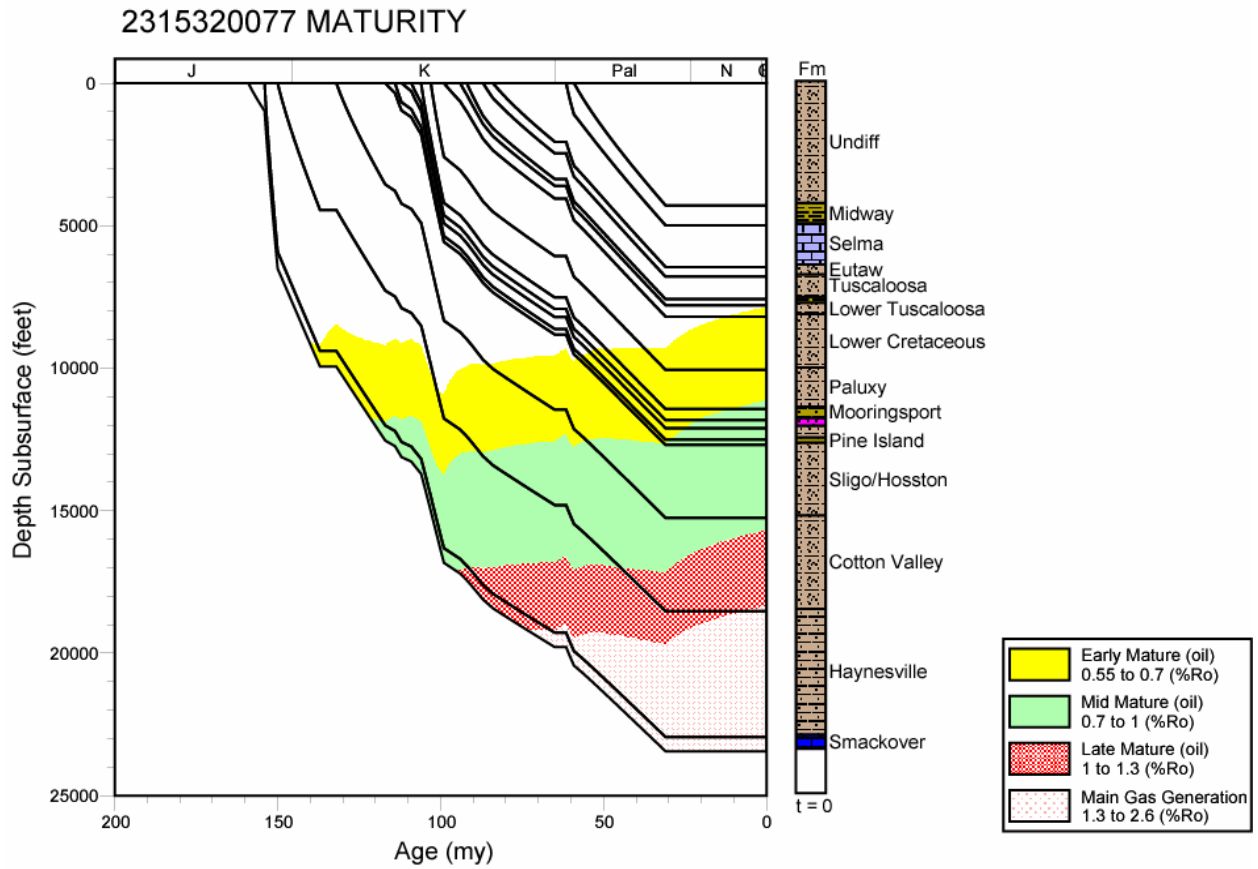


Figure 91. Thermal maturation profile for well 2315320077, Mississippi Interior Salt Basin.

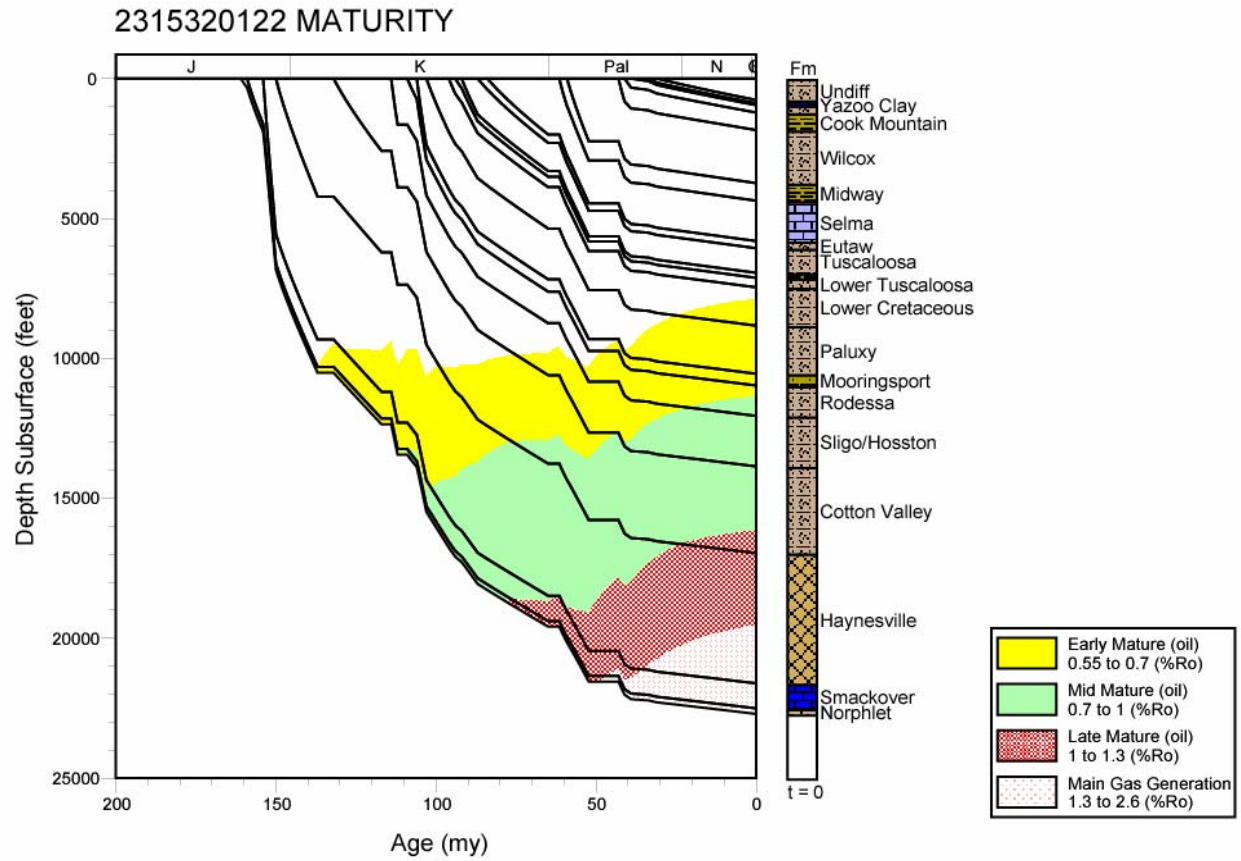


Figure 92. Thermal maturation profile for well 2315320122, Mississippi Interior Salt Basin.

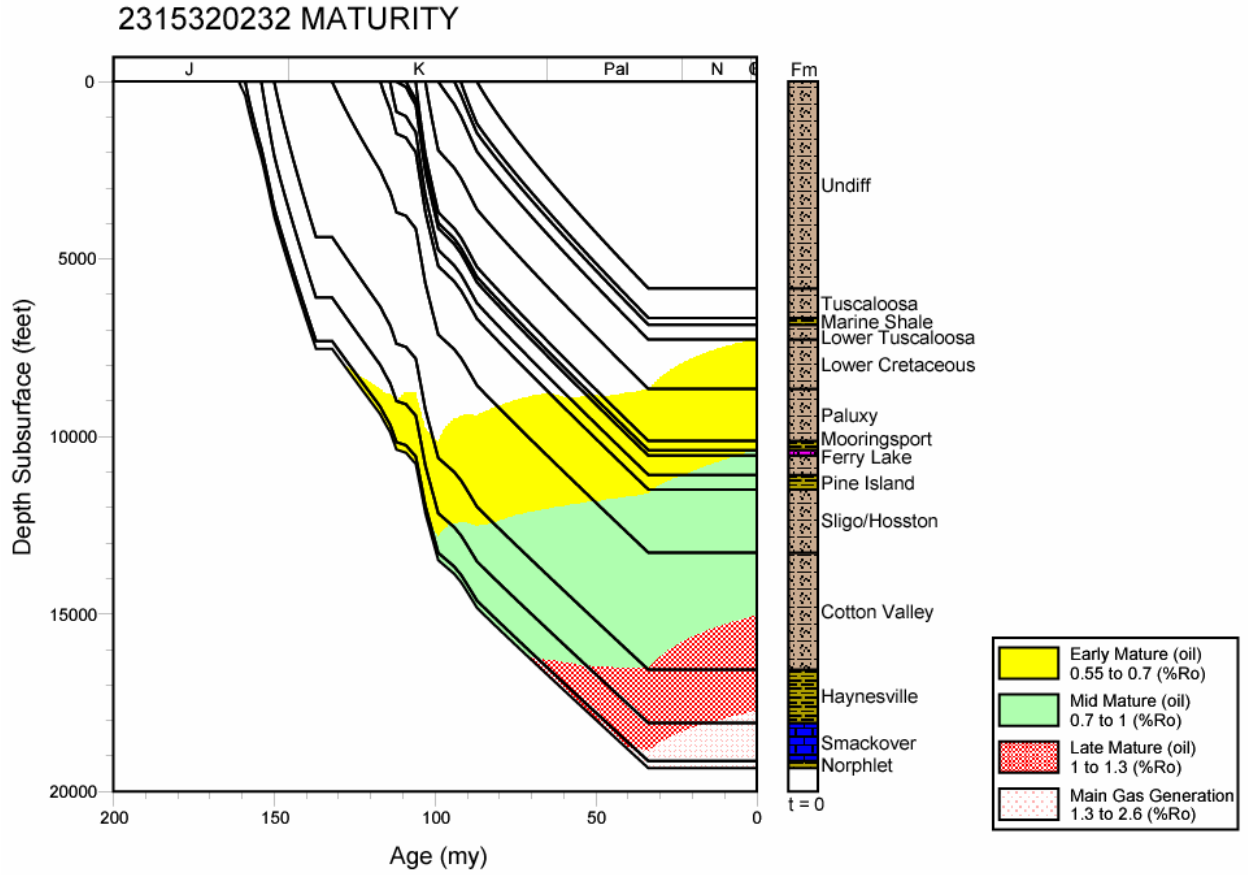


Figure 93. Thermal maturation profile for well 2315320232, Mississippi Interior Salt Basin.

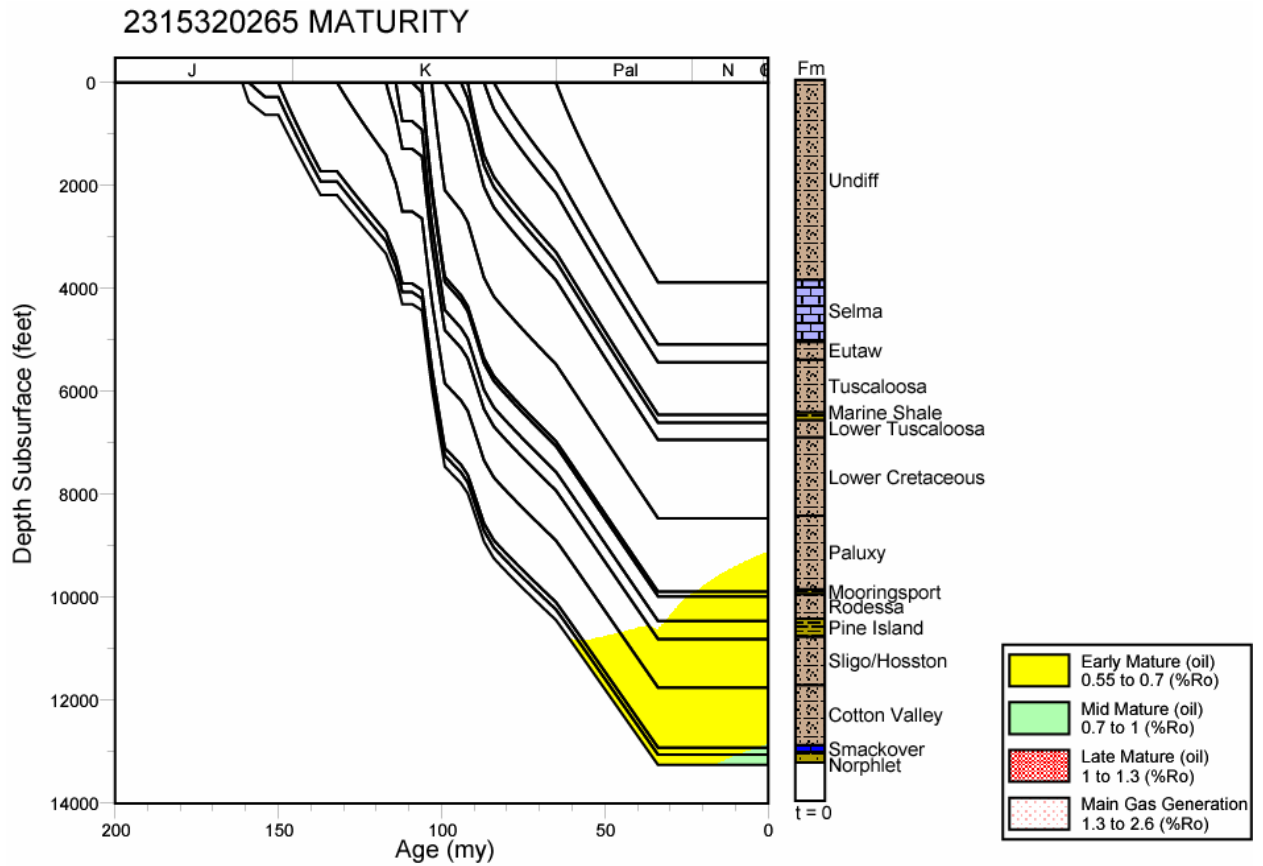


Figure 94. Thermal maturation profile for well 2315320265, Mississippi Interior Salt Basin.

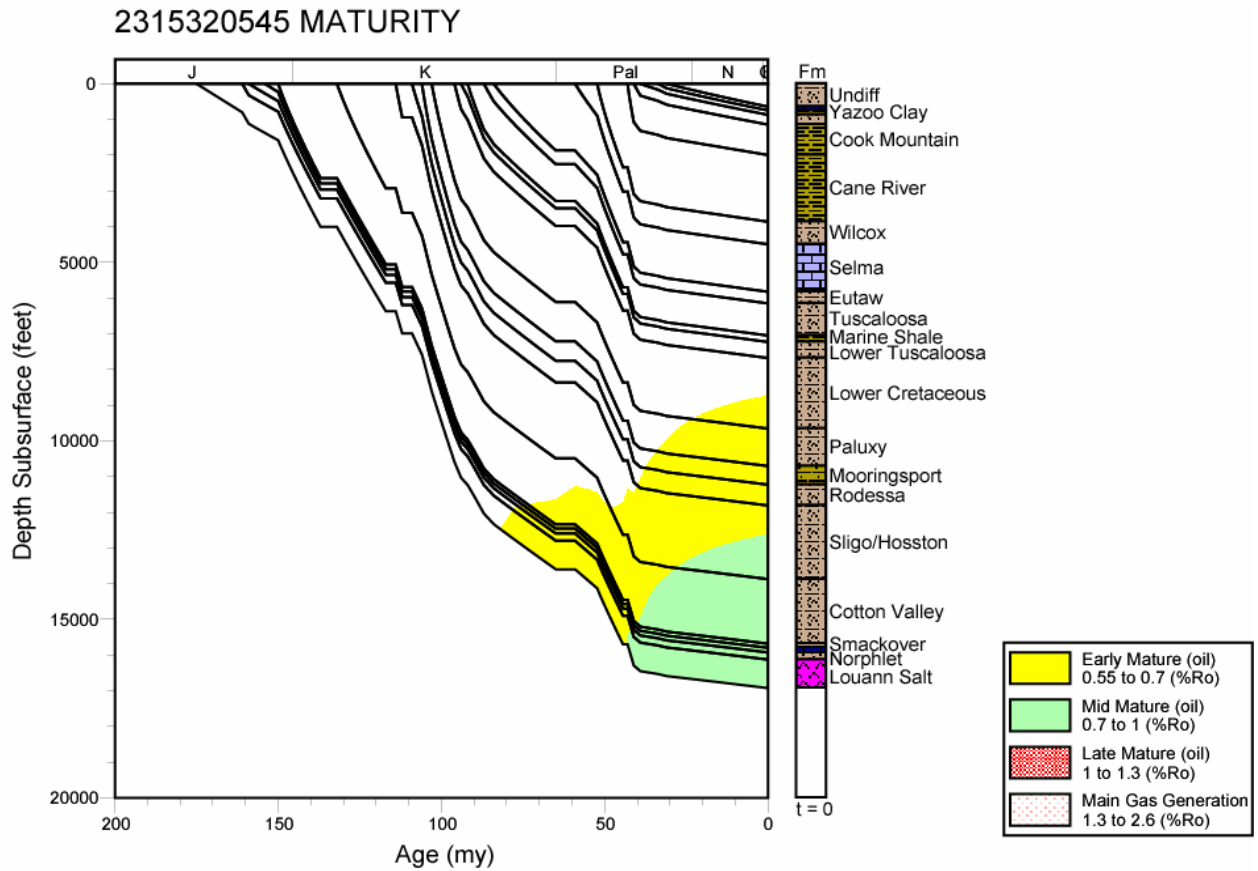


Figure 95. Thermal maturation profile for well 2315320545, Mississippi Interior Salt Basin.

# 2316300049 MATURITY

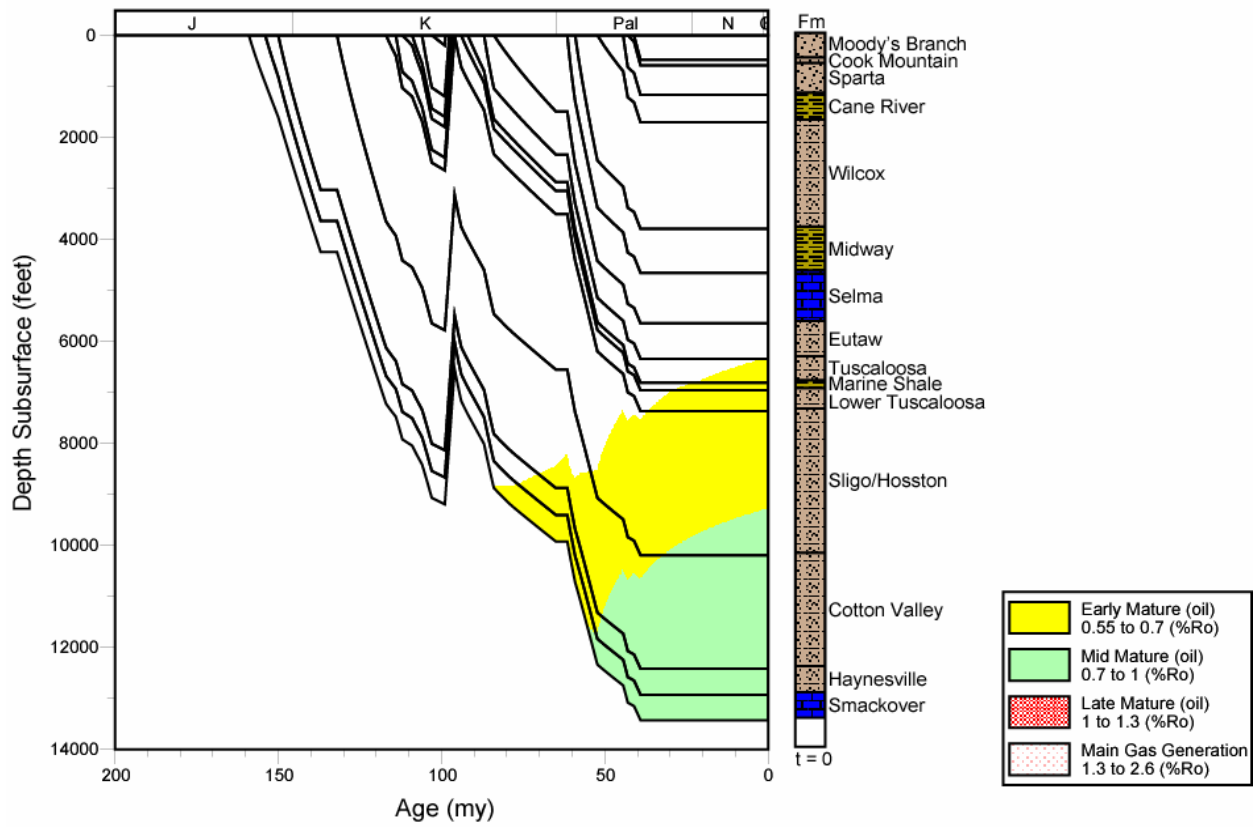


Figure 96. Thermal maturation profile for well 2316300049, Mississippi Interior Salt Basin.



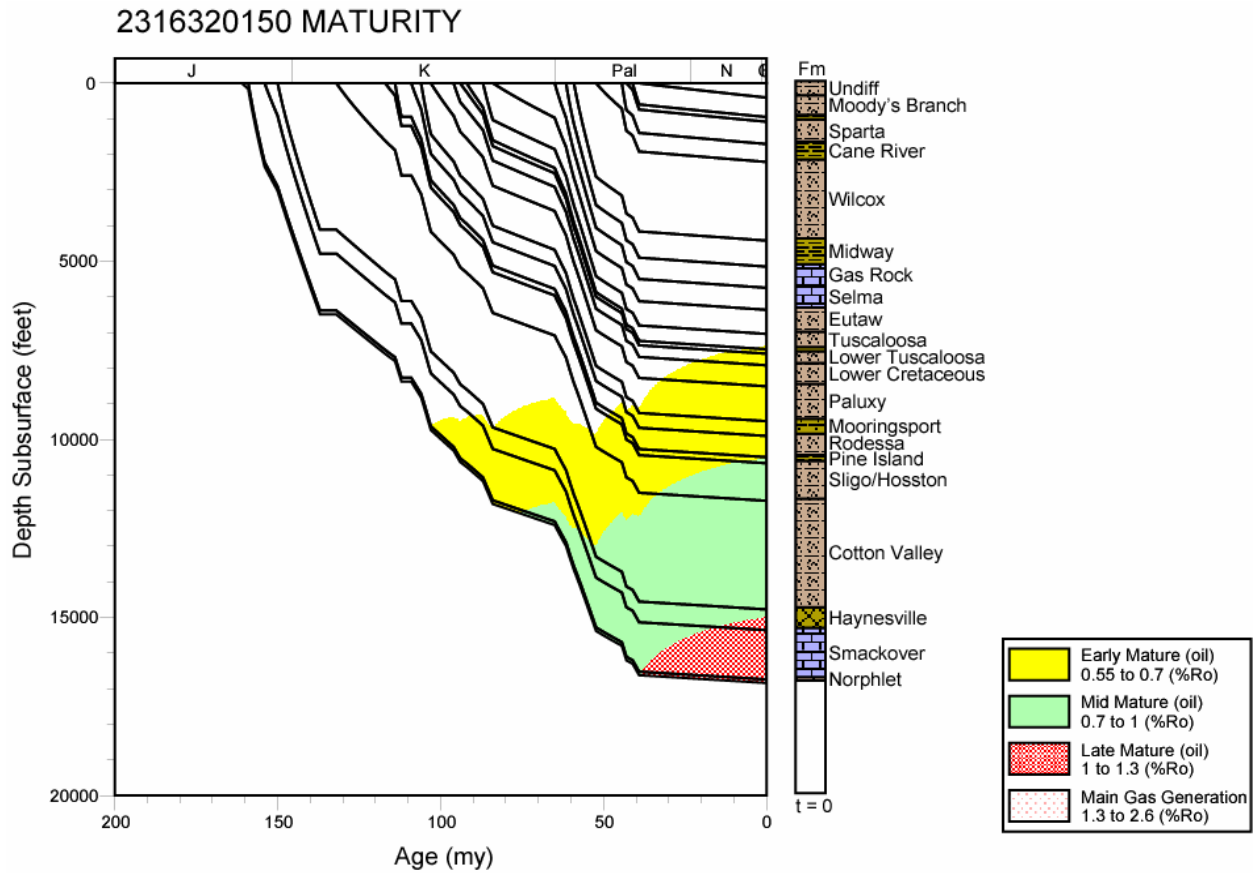


Figure 97. Thermal maturation profile for well 2316320150, Mississippi Interior Salt Basin.

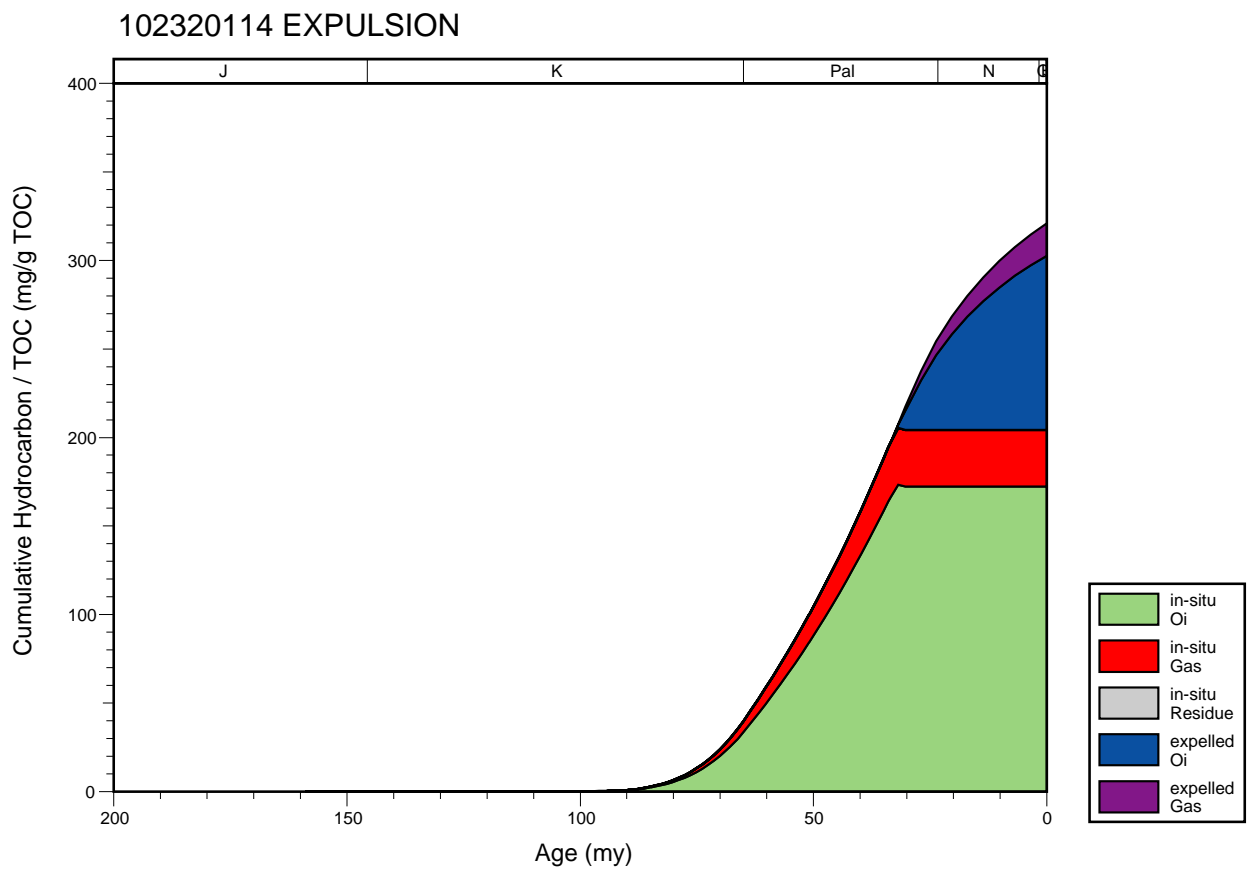


Figure 98. Hydrocarbon expulsion plot for well 102320114, Mississippi Interior Salt Basin.

# 102320197 EXPULSION

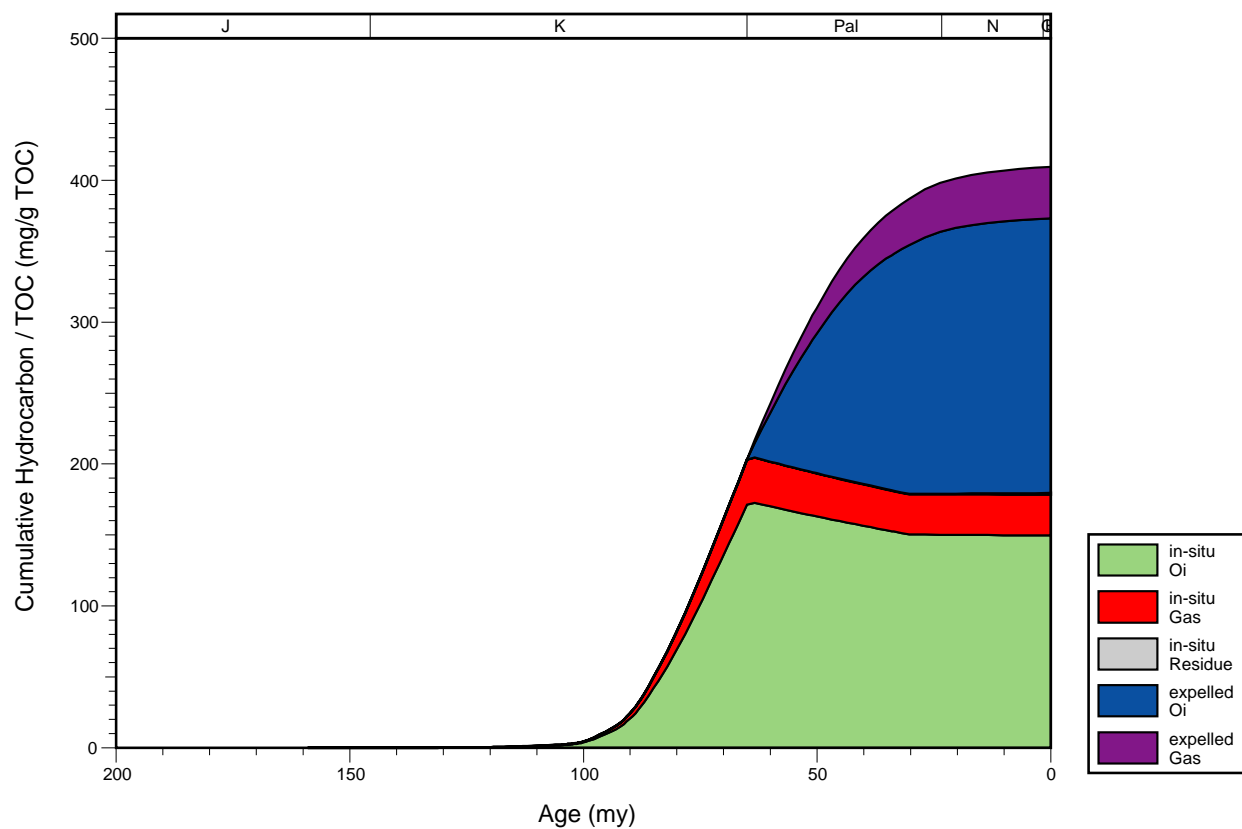


Figure 99. Hydrocarbon expulsion plot for well 102320197, Mississippi Interior Salt Basin.

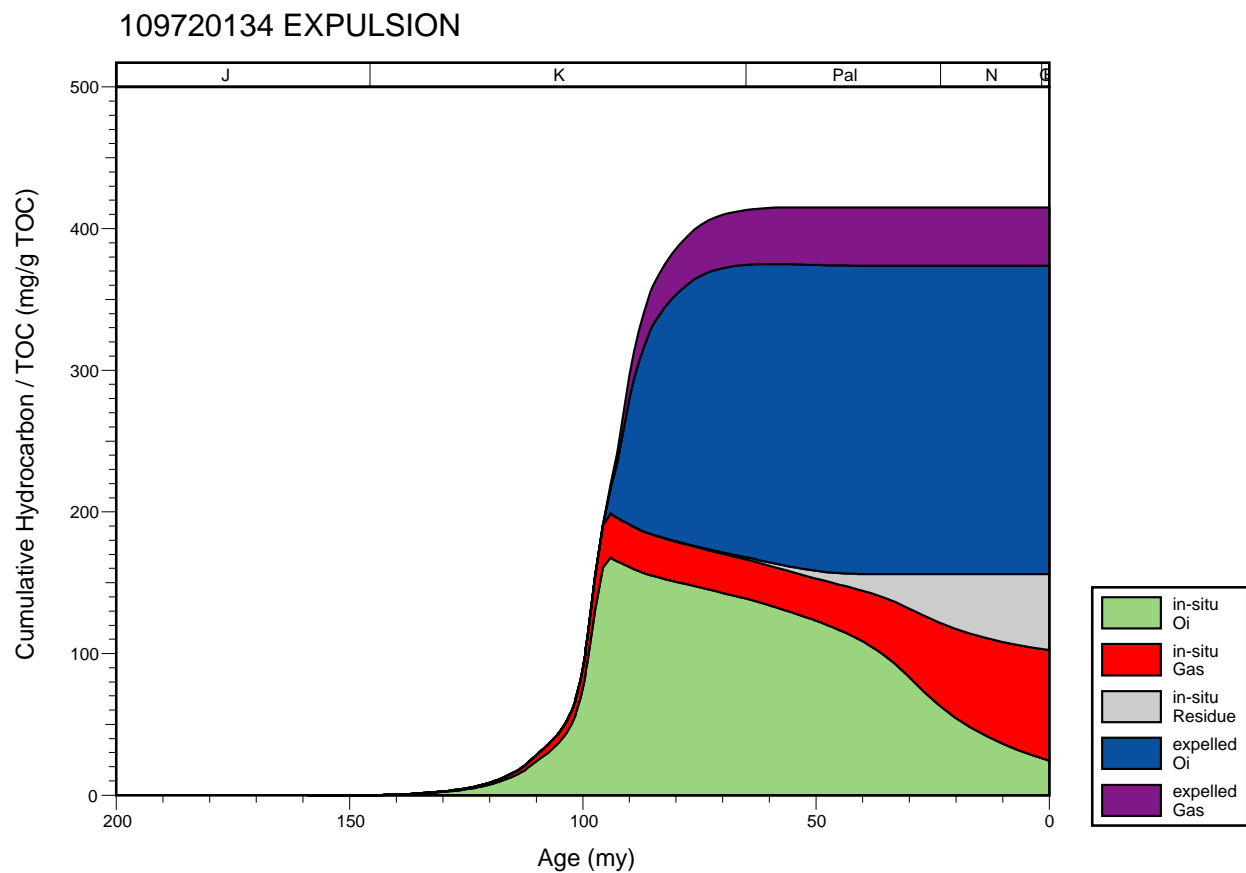


Figure 100. Hydrocarbon expulsion plot for well 109720134, Mississippi Interior Salt Basin.

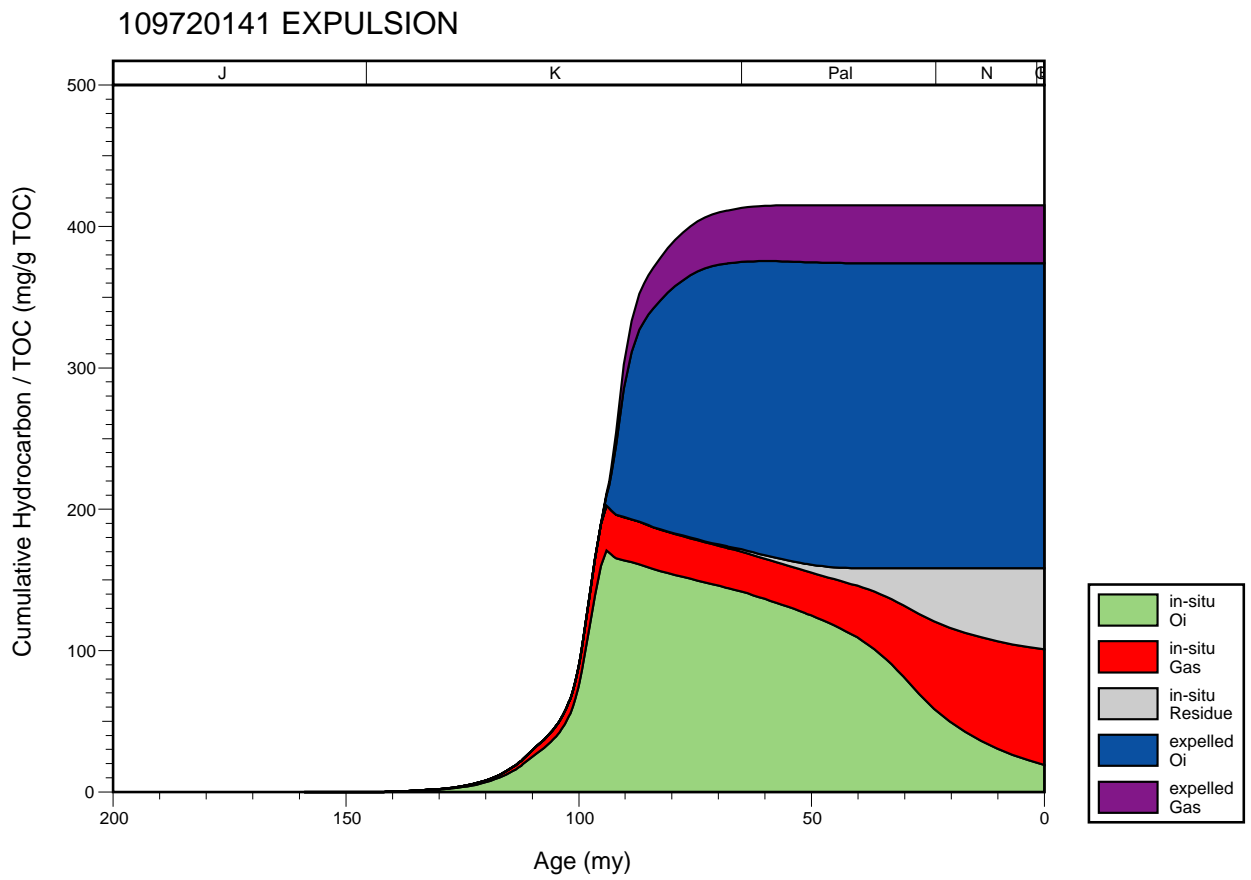


Figure 101. Hydrocarbon expulsion plot for well 109720141, Mississippi Interior Salt Basin.

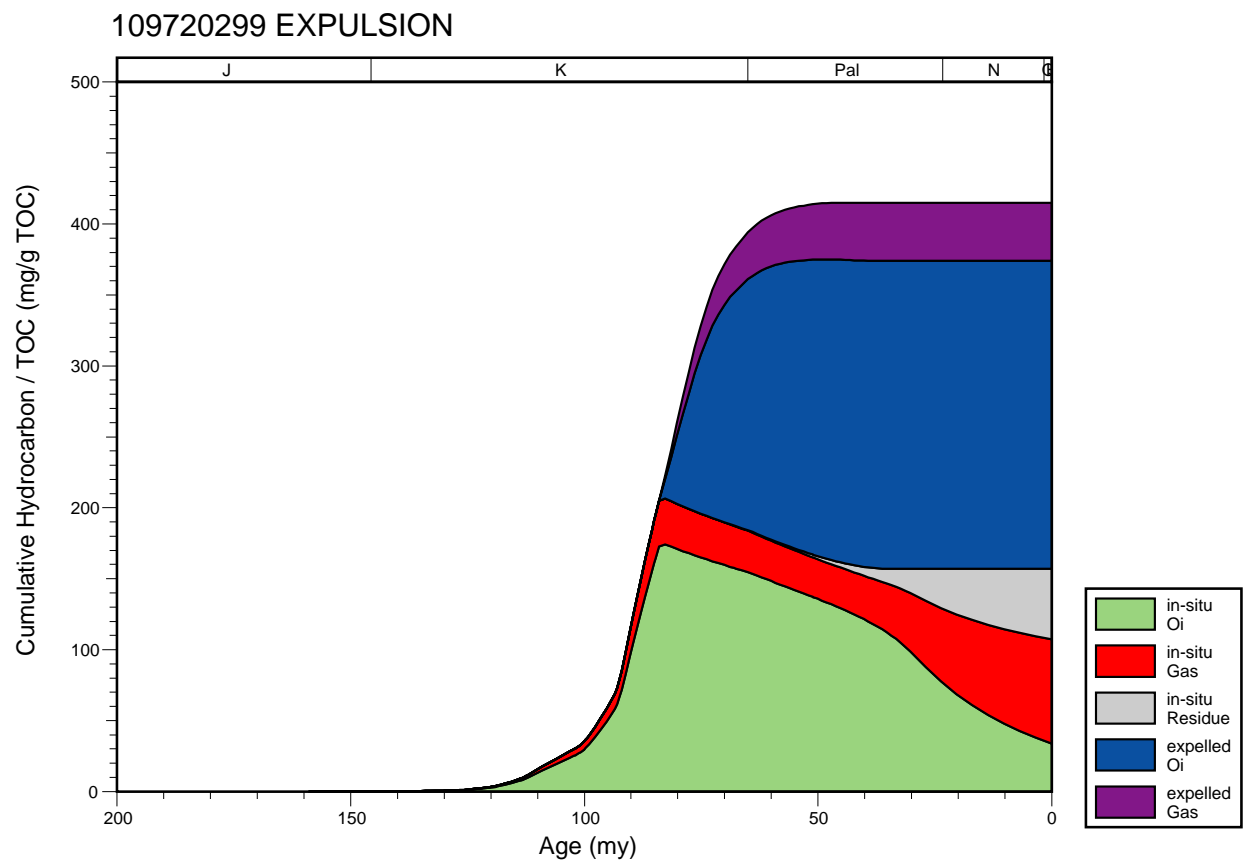


Figure 102. Hydrocarbon expulsion plot for well 109720299, Mississippi Interior Salt Basin.

# 112920012 EXPULSION

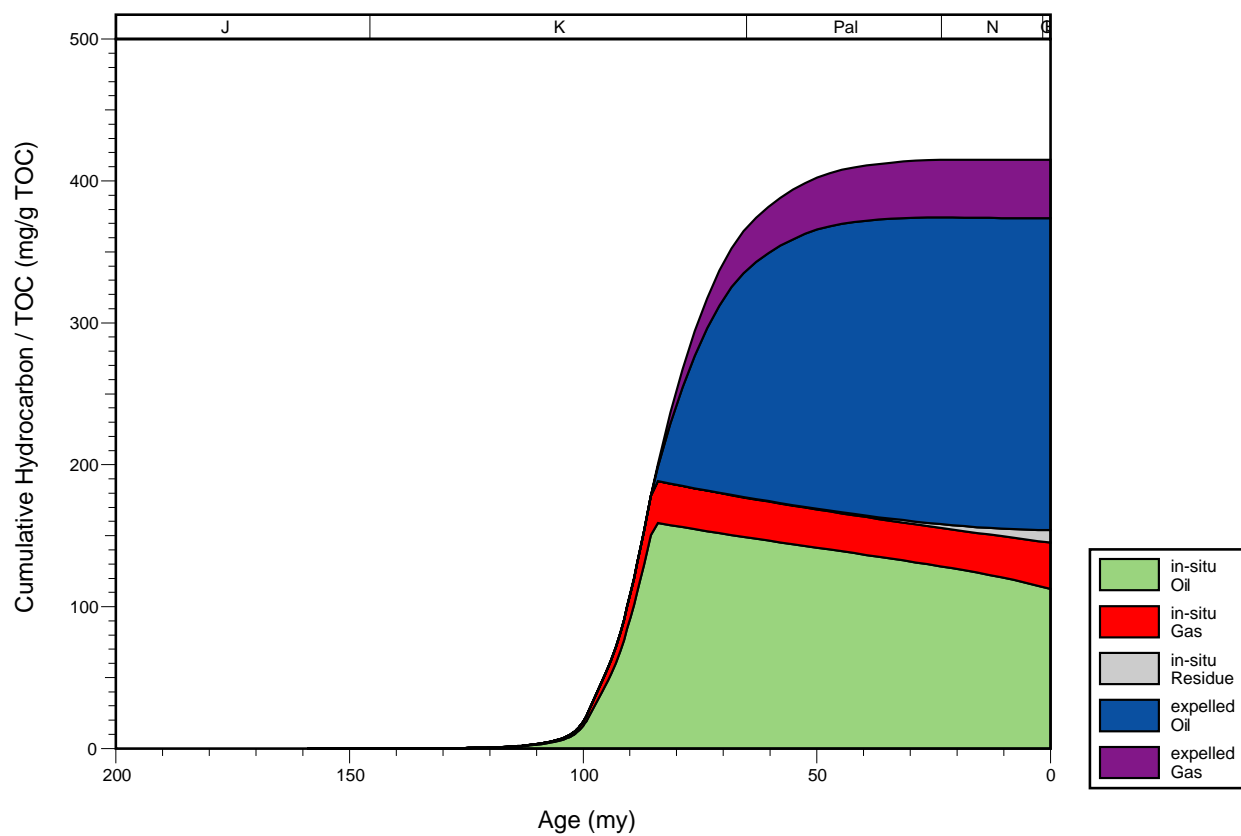


Figure 103. Hydrocarbon expulsion plot for well 112920012, Mississippi Interior Salt Basin.

# 112920024 EXPULSION

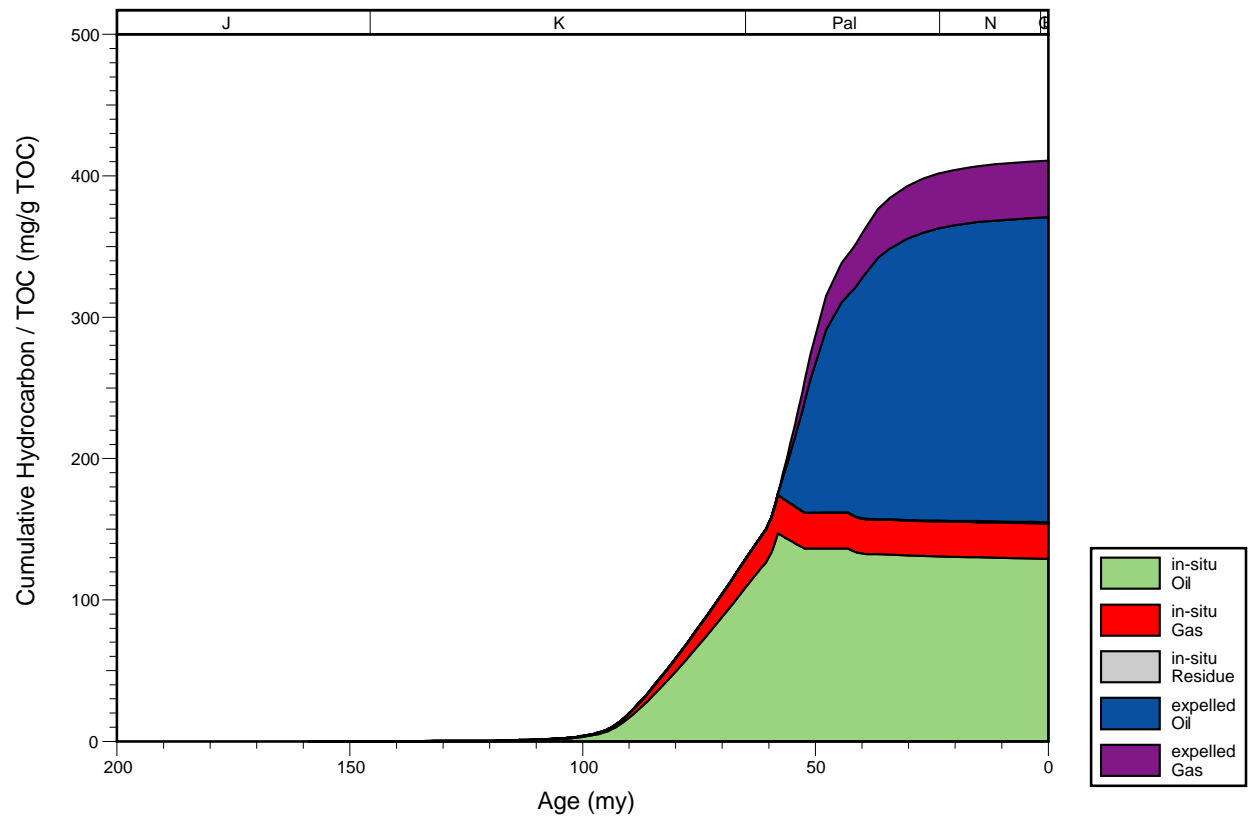


Figure 104. Hydrocarbon expulsion plot for well 112920024, Mississippi Interior Salt Basin.



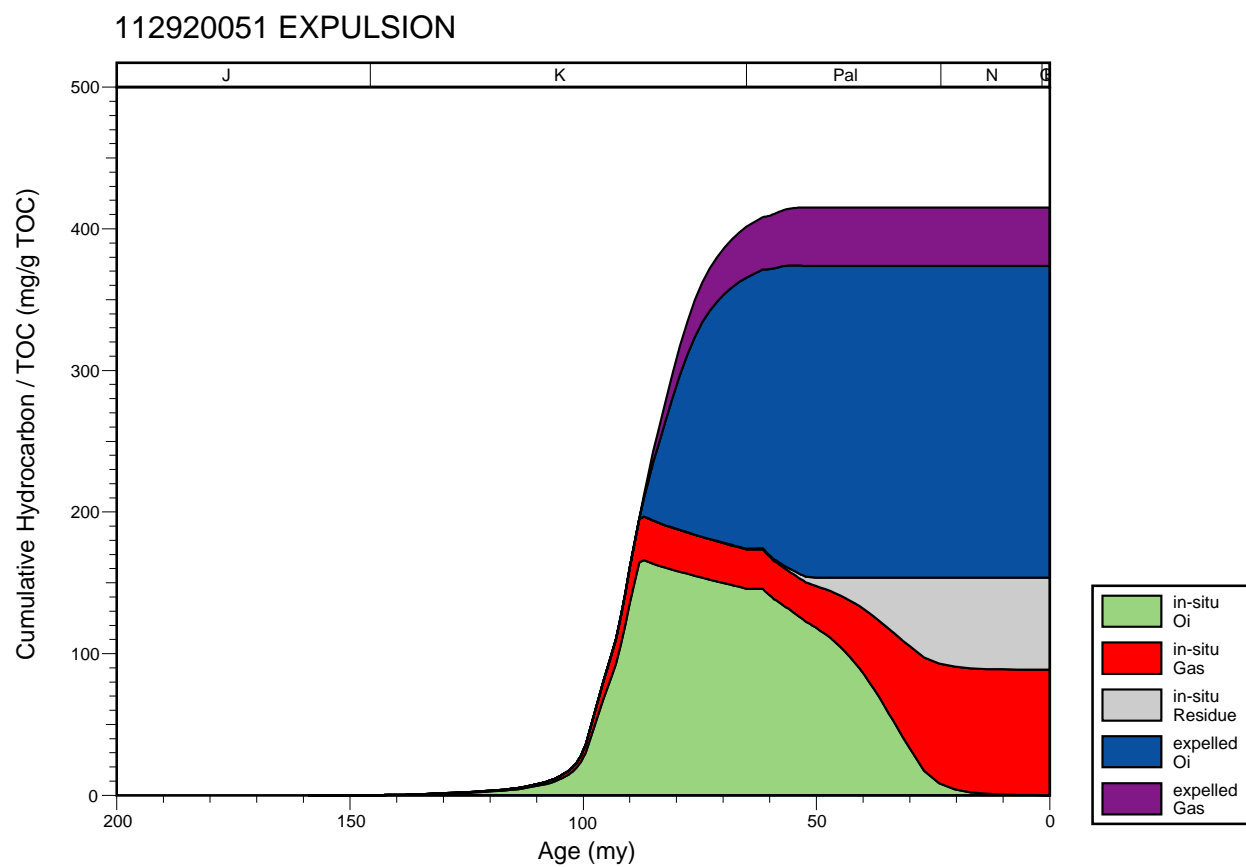


Figure 105. Hydrocarbon expulsion plot for well 112920051, Mississippi Interior Salt Basin.

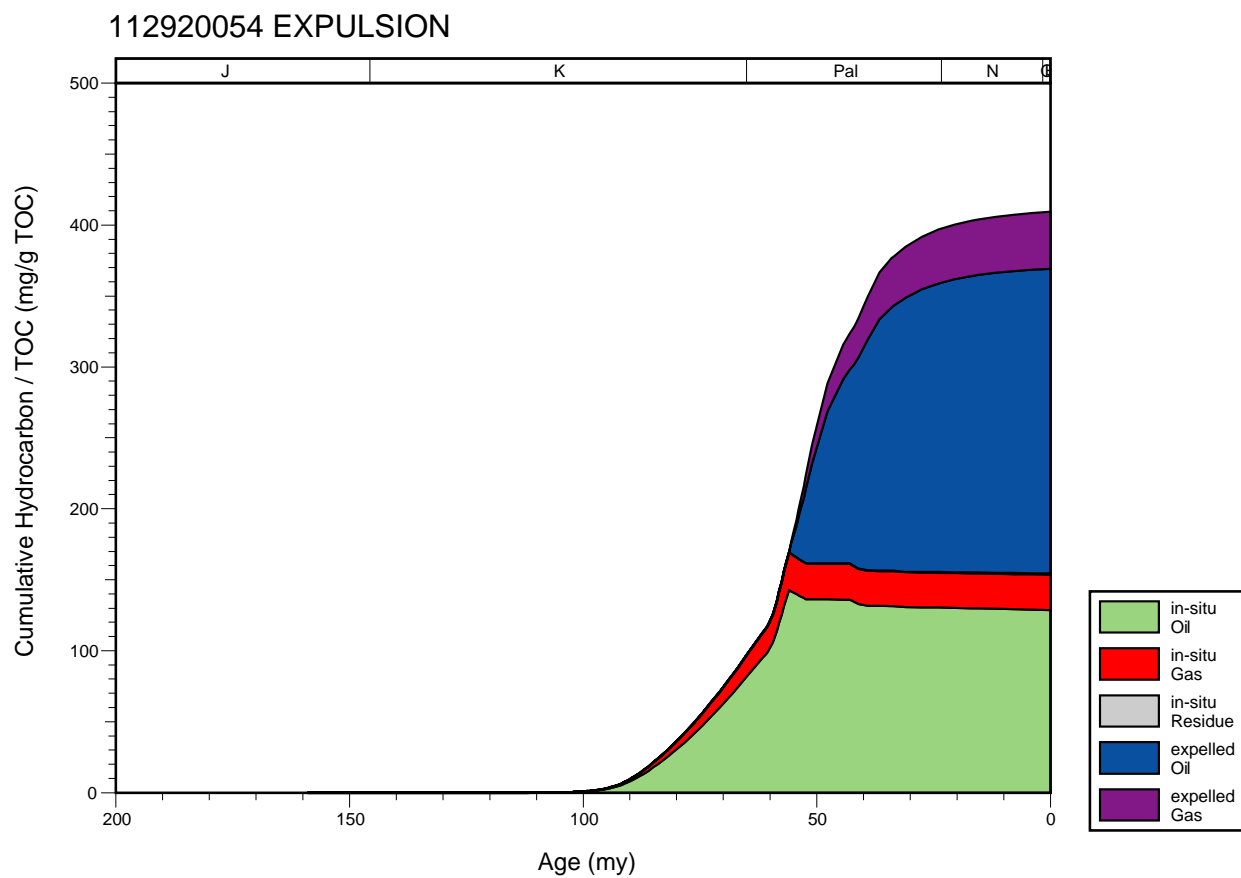


Figure 106. Hydrocarbon expulsion plot for well 112920054, Mississippi Interior Salt Basin.

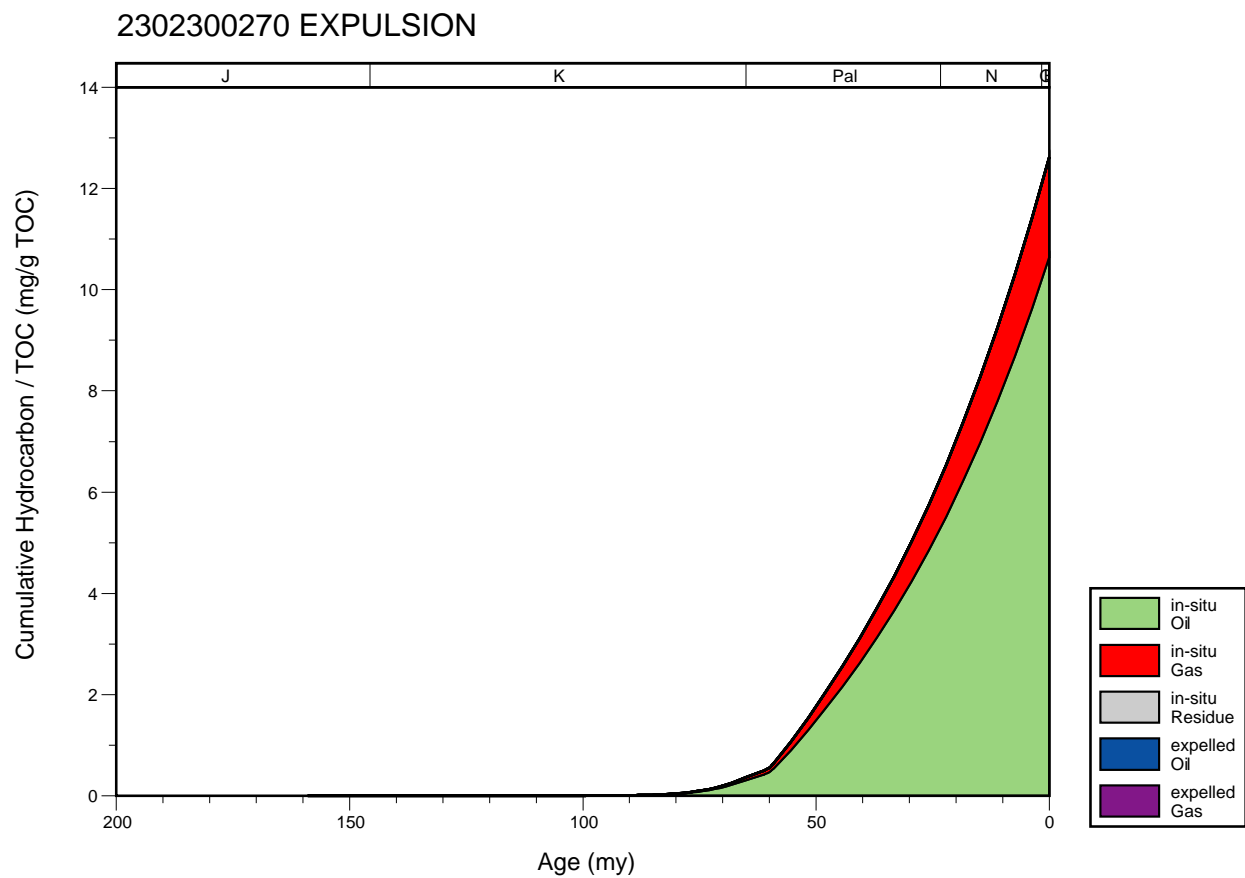


Figure 107. Hydrocarbon expulsion plot for well 2302300270, Mississippi Interior Salt Basin.

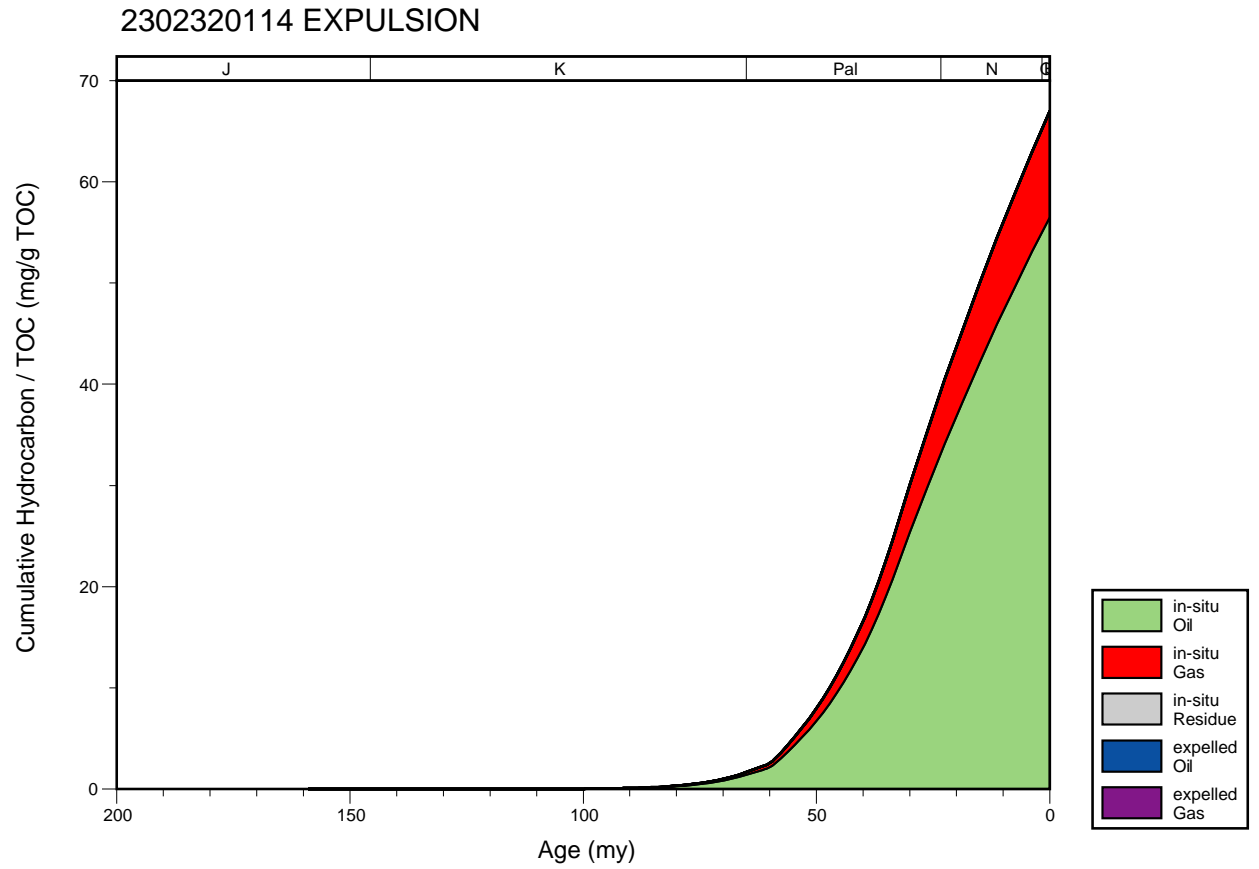


Figure 108. Hydrocarbon expulsion plot for well 2302320114, Mississippi Interior Salt Basin.

# 2304520075 EXPULSION

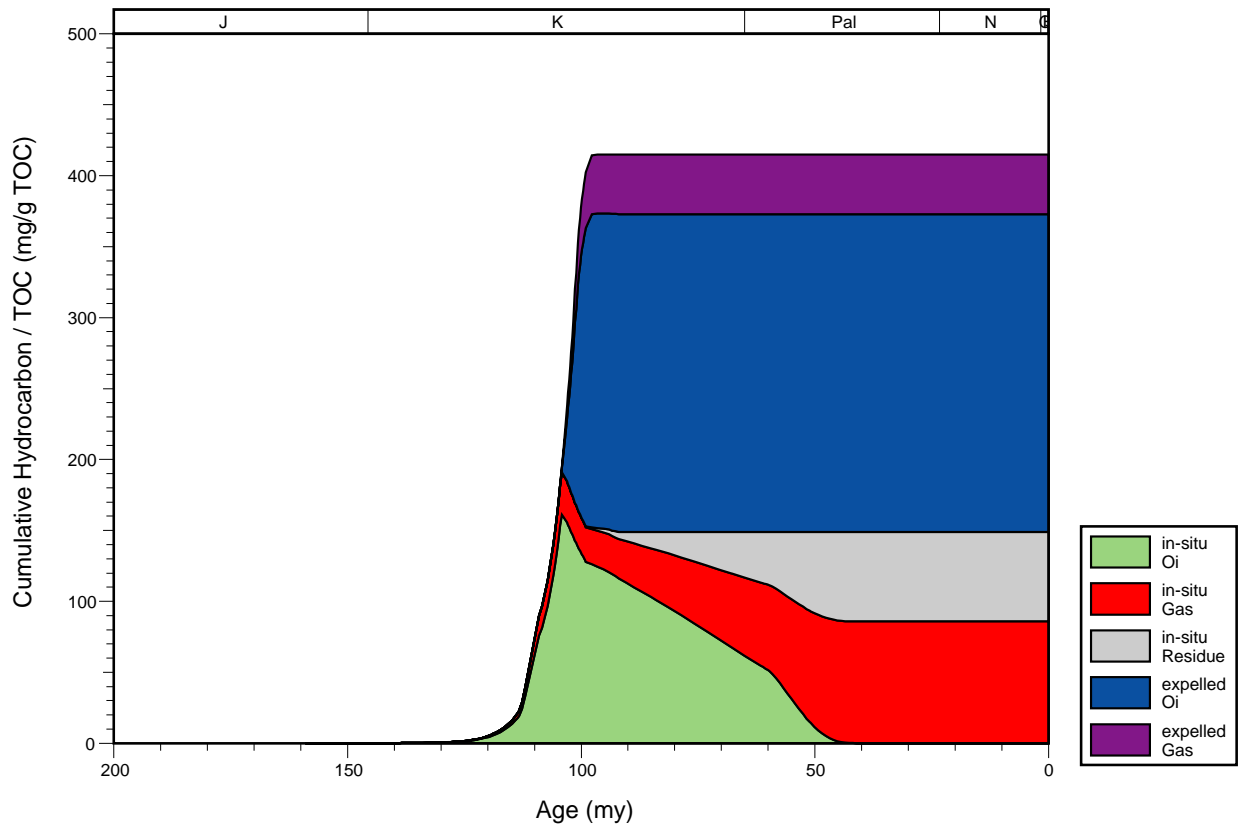


Figure 109. Hydrocarbon expulsion plot for well 2304520075, Mississippi Interior Salt Basin.

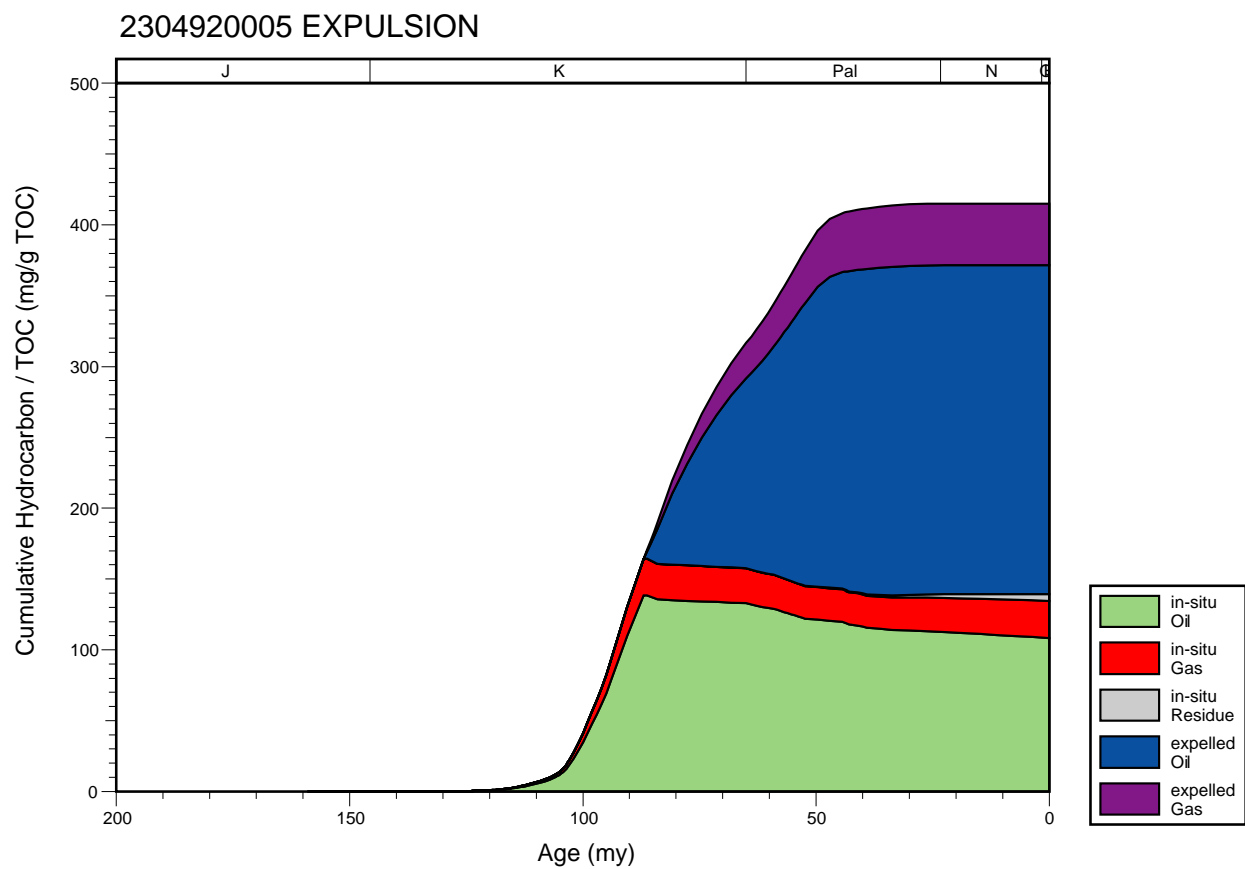


Figure 110. Hydrocarbon expulsion plot for well 2304920005, Mississippi Interior Salt Basin.

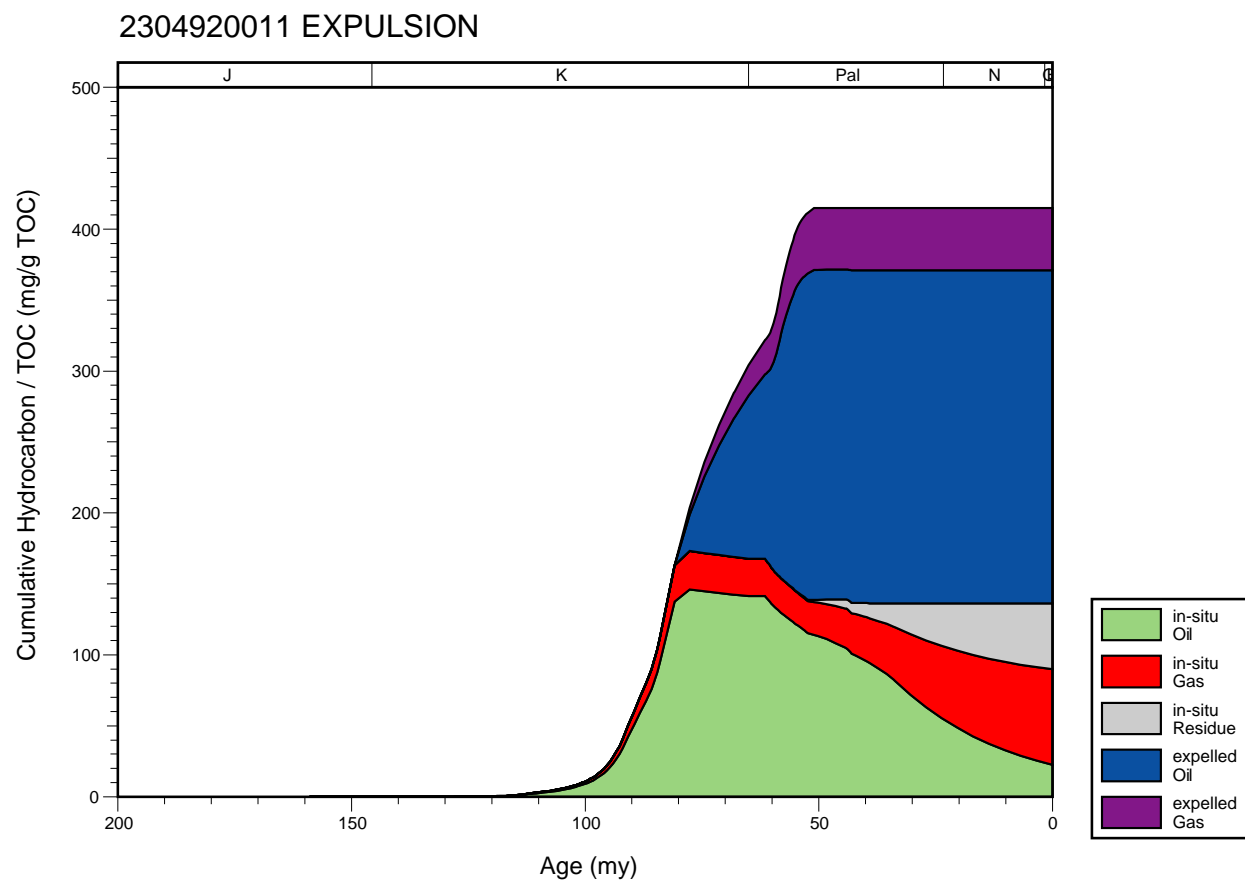


Figure 111. Hydrocarbon expulsion plot for well 2304920011, Mississippi Interior Salt Basin.

# 2304920032 EXPULSION

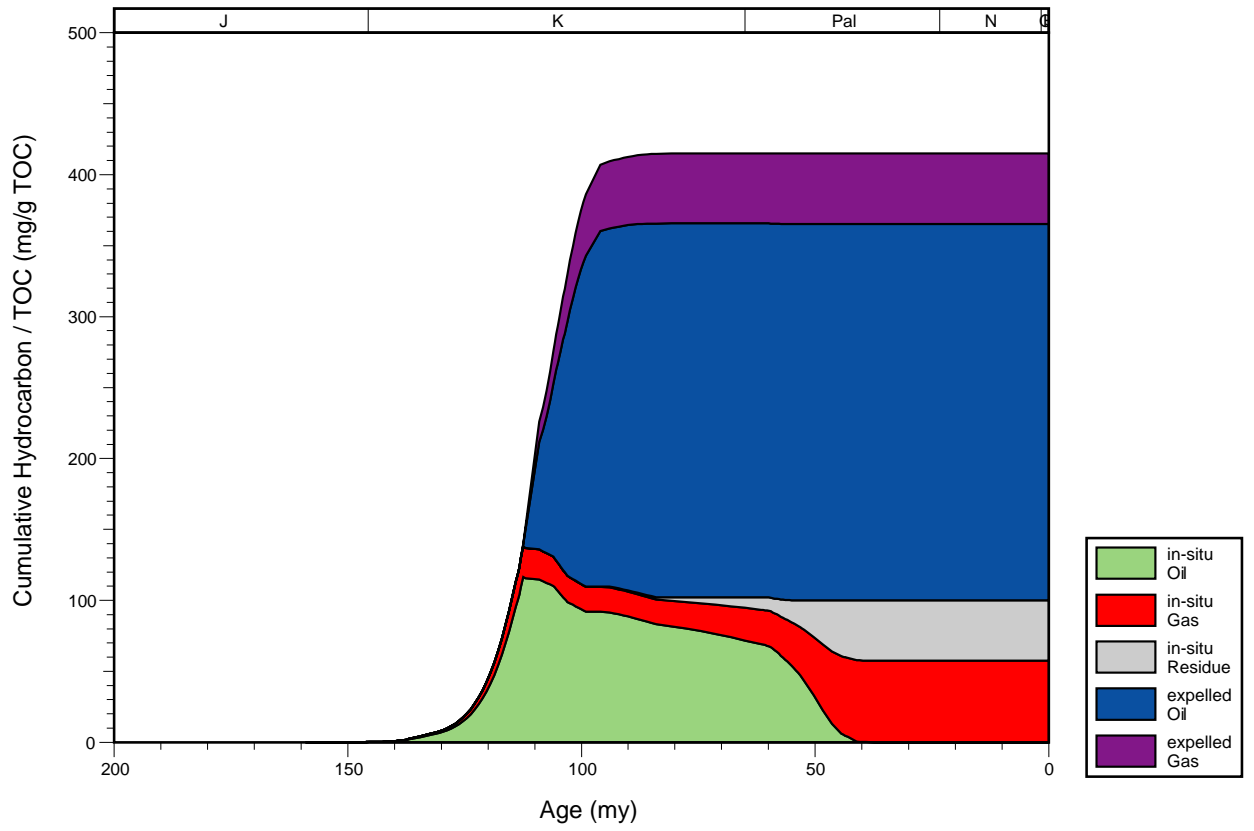


Figure 112. Hydrocarbon expulsion plot for well 2304920032, Mississippi Interior Salt Basin.



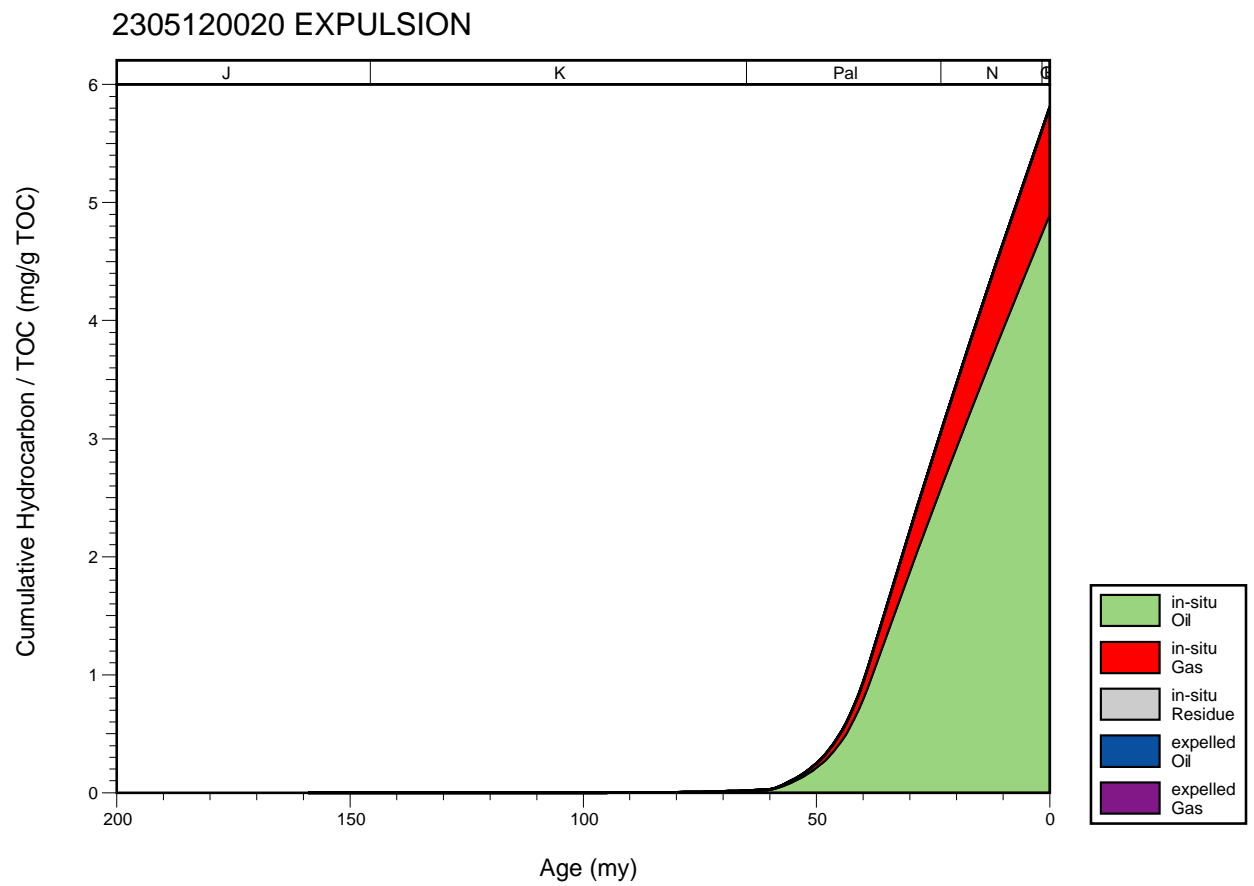


Figure 113. Hydrocarbon expulsion plot for well 2305120020, Mississippi Interior Salt Basin.

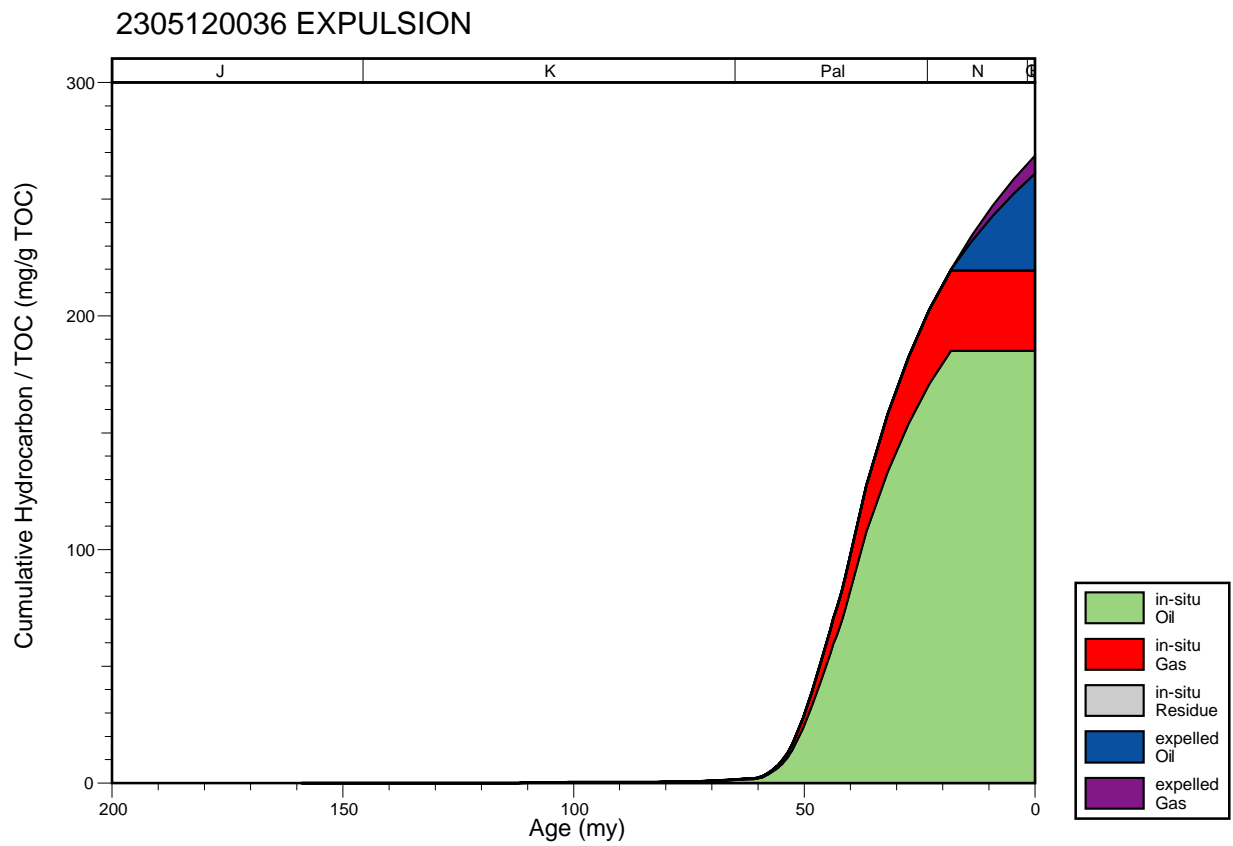


Figure 114. Hydrocarbon expulsion plot for well 2305120036, Mississippi Interior Salt Basin.

# 2305500032 EXPULSION

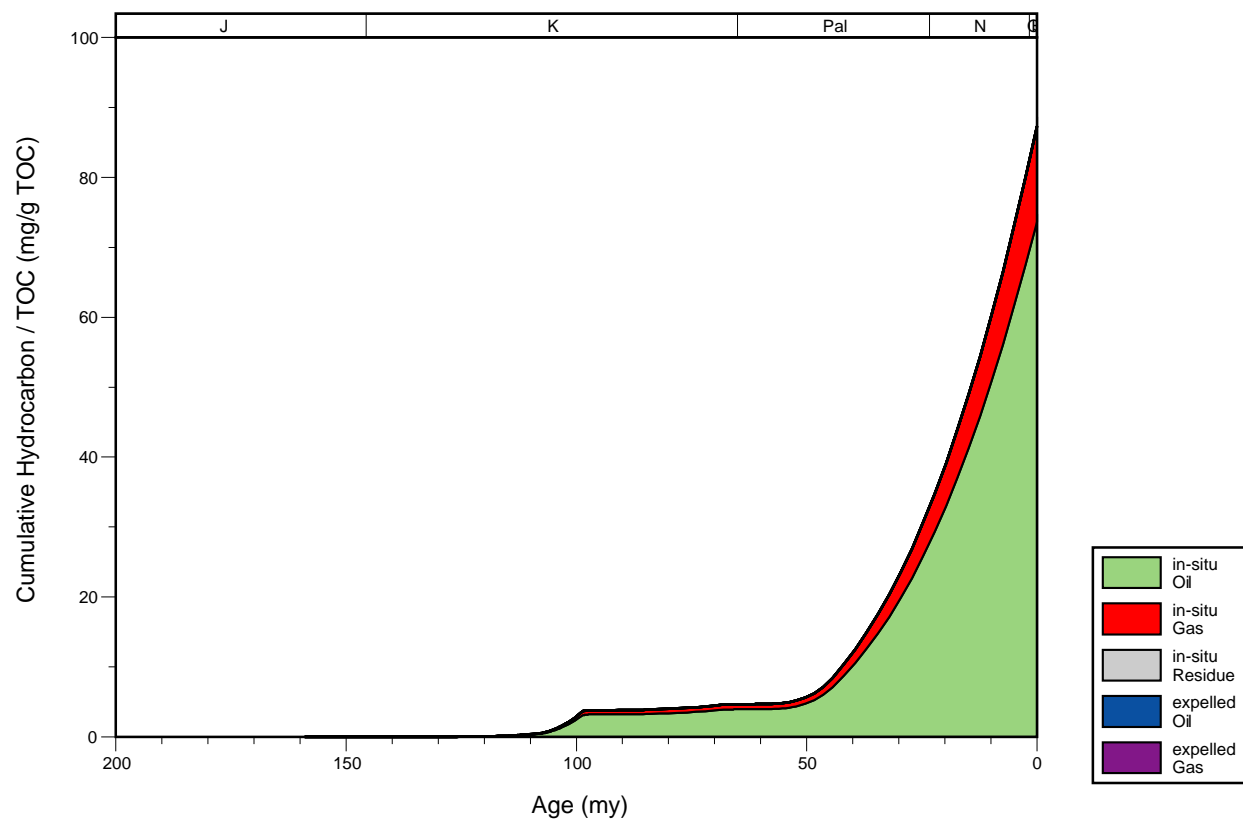


Figure 115. Hydrocarbon expulsion plot for well 2305500032, Mississippi Interior Salt Basin.

# 2305500066 EXPULSION

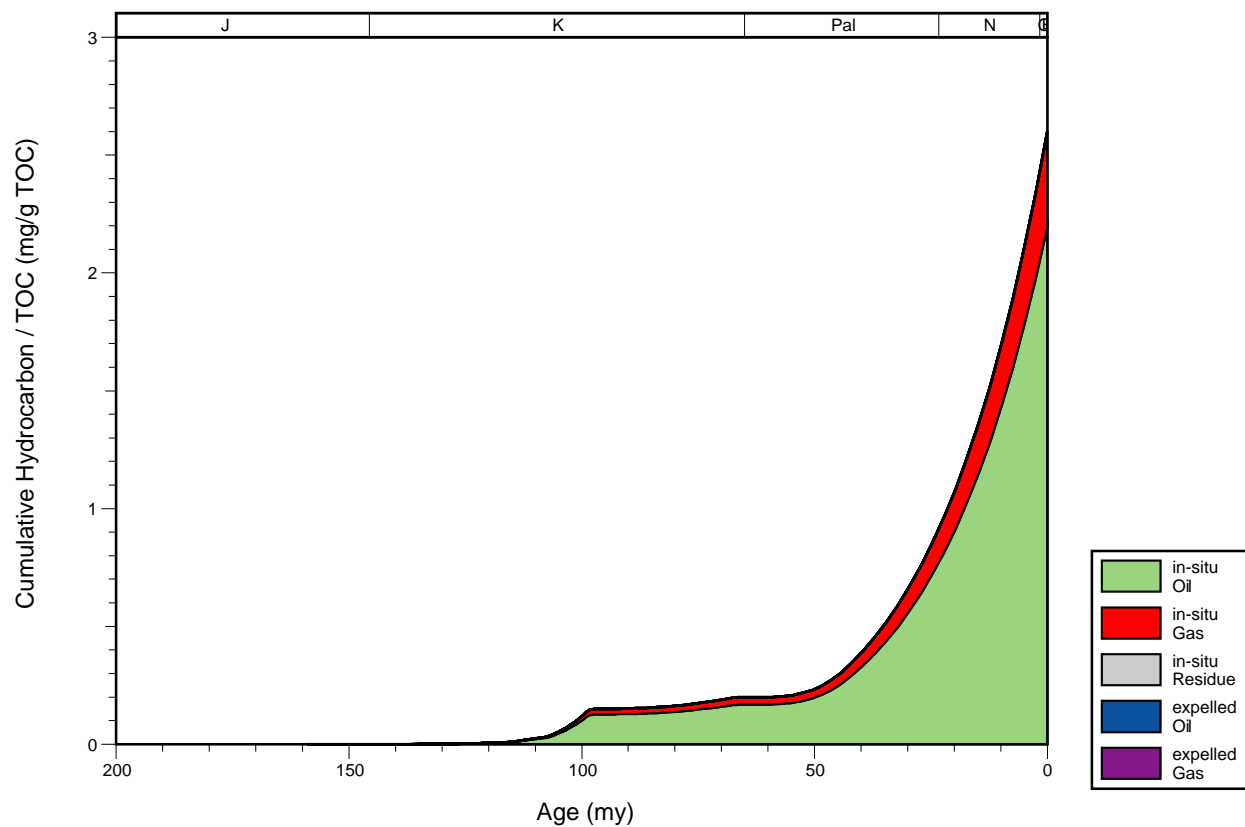


Figure 116. Hydrocarbon expulsion plot for well 2305500066, Mississippi Interior Salt Basin.

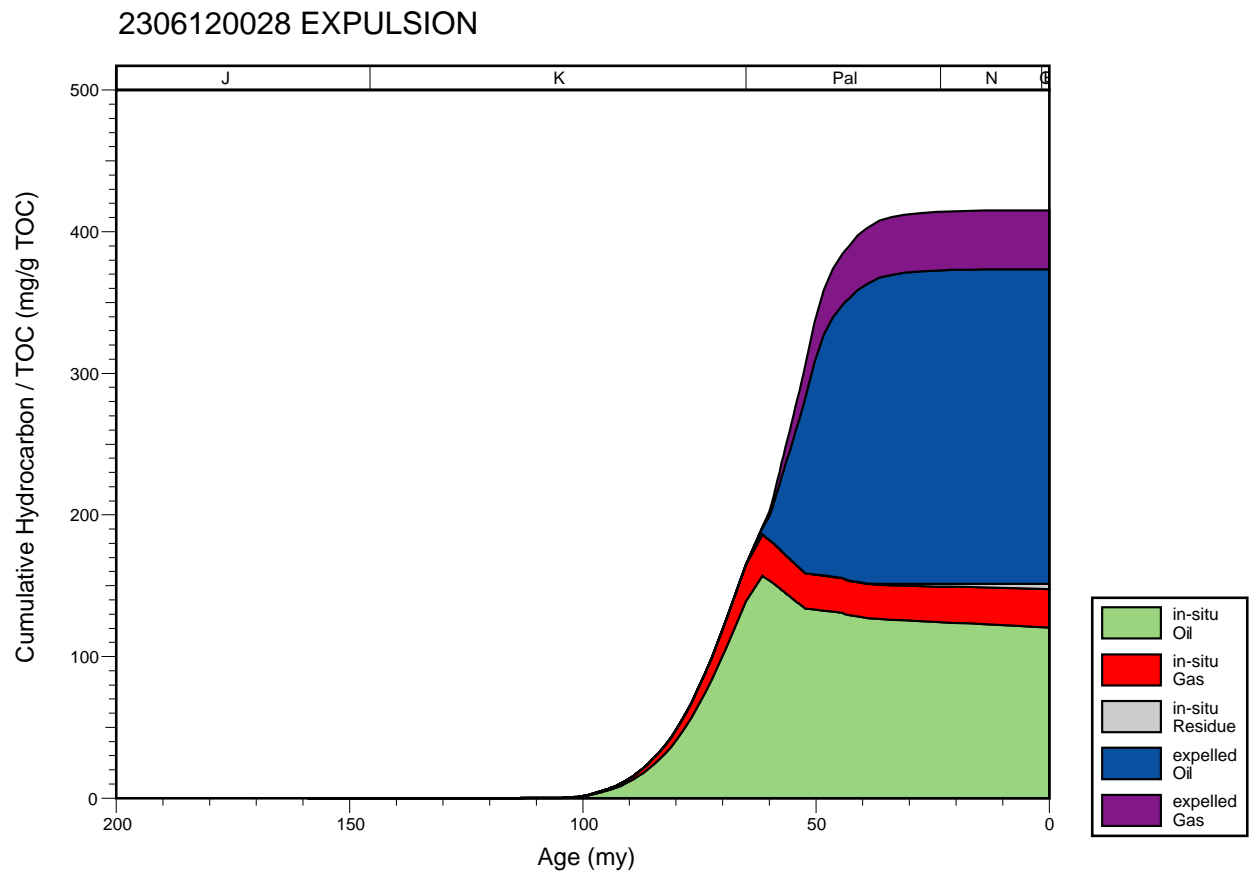


Figure 117. Hydrocarbon expulsion plot for well 2306120028, Mississippi Interior Salt Basin.

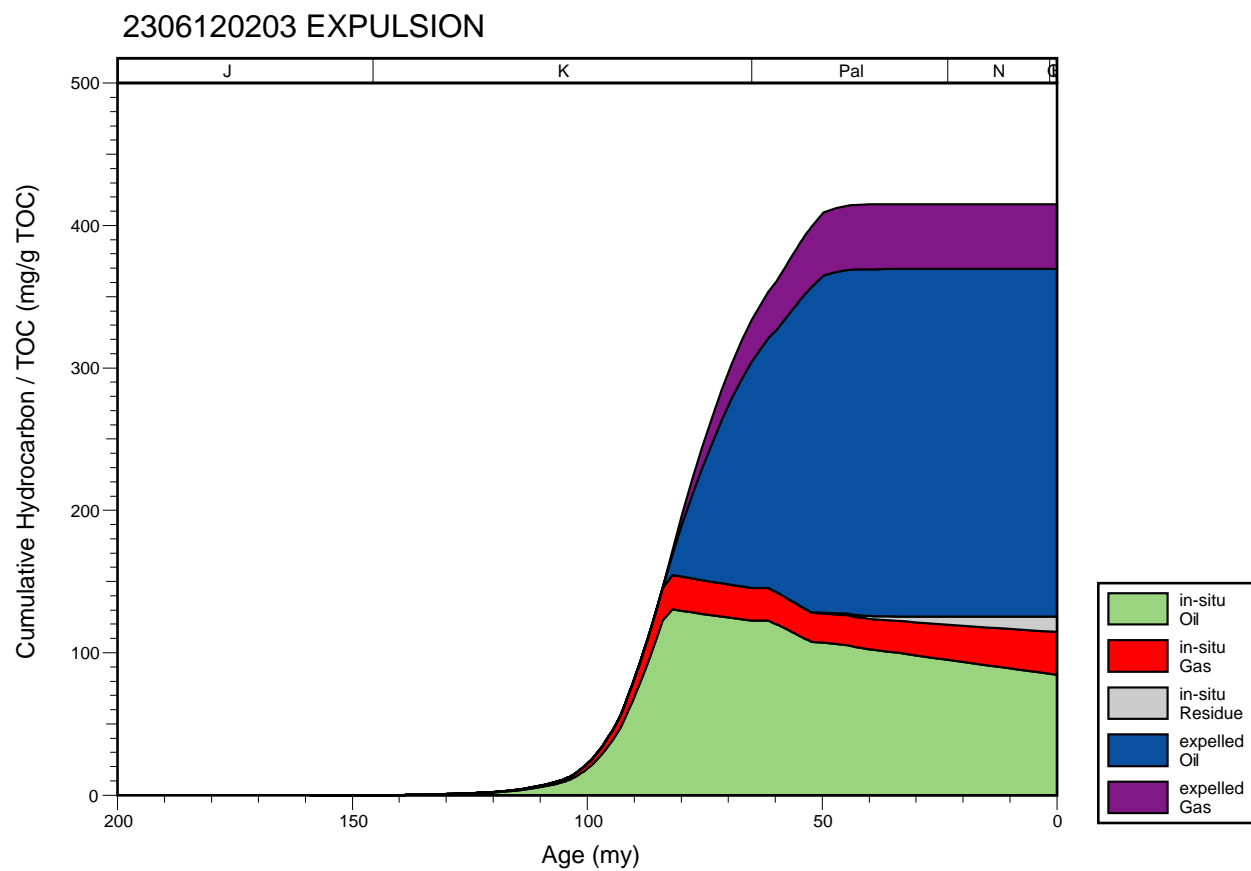


Figure 118. Hydrocarbon expulsion plot for well 2306120203, Mississippi Interior Salt Basin.

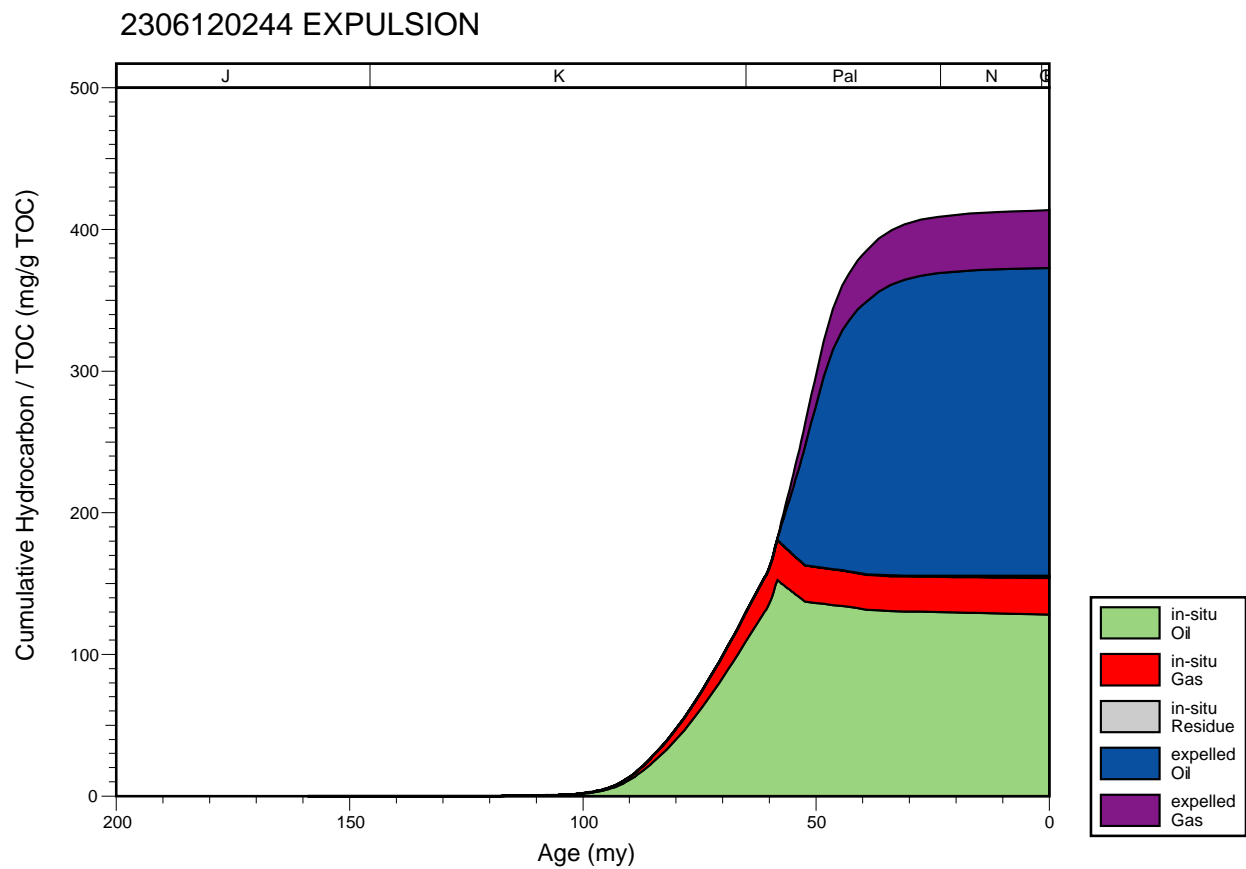


Figure 119. Hydrocarbon expulsion plot for well 2306120244, Mississippi Interior Salt Basin.

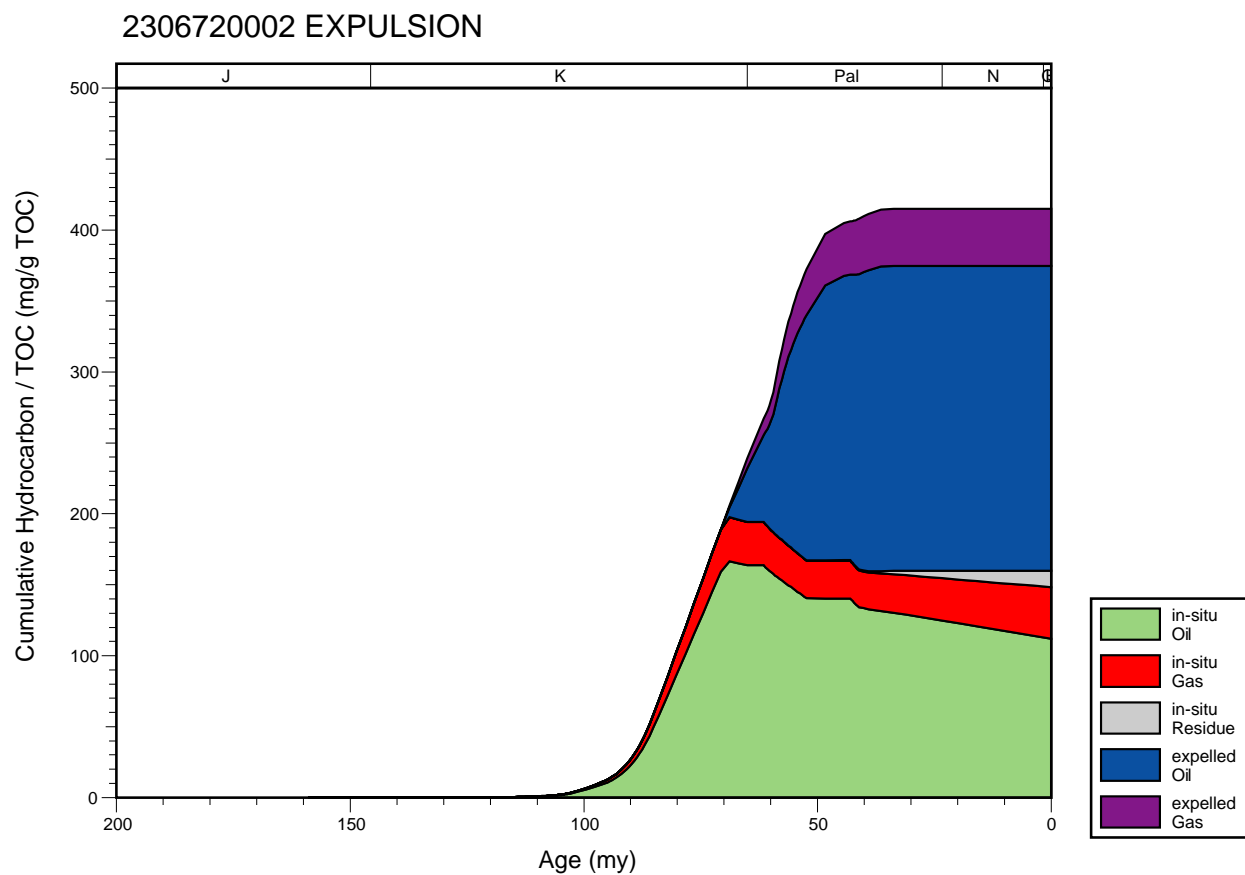


Figure 120. Hydrocarbon expulsion plot for well 2306720002, Mississippi Interior Salt Basin.



# 2308320011 EXPULSION

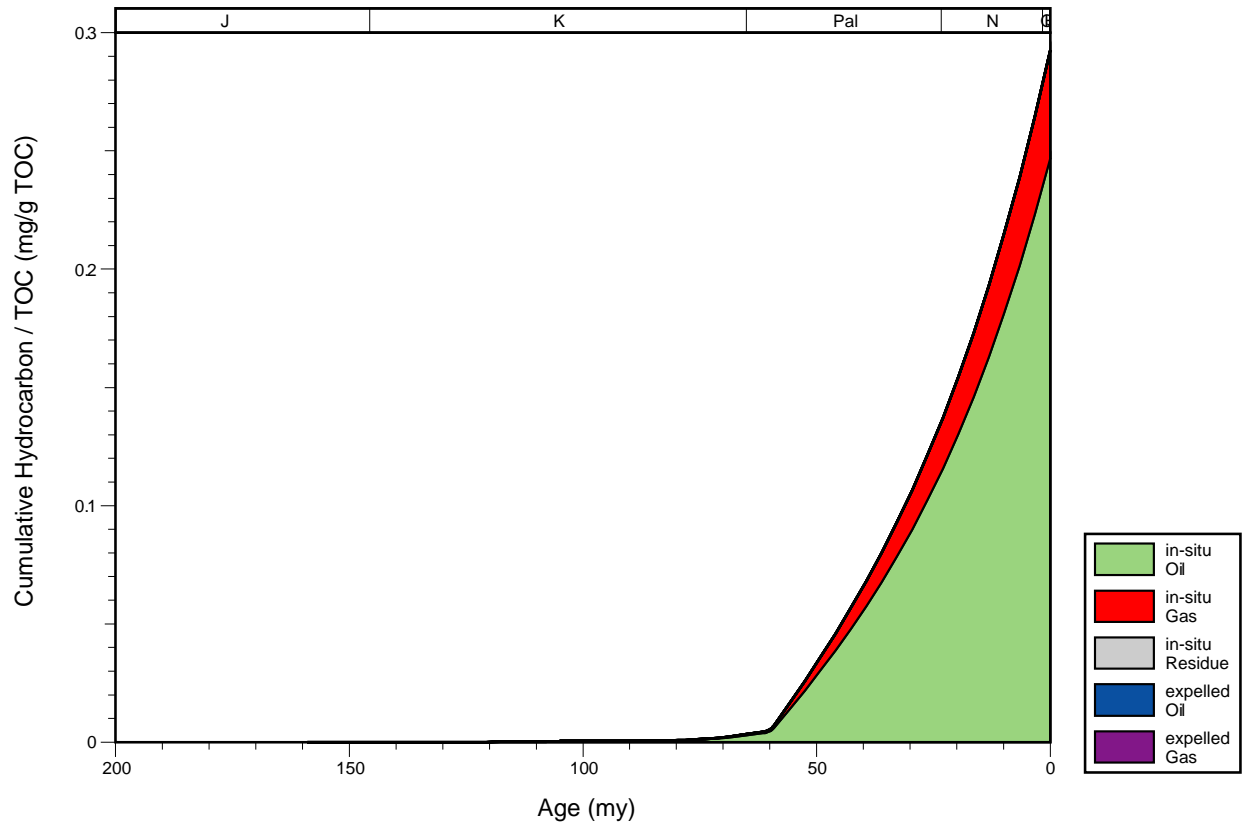


Figure 121. Hydrocarbon expulsion plot for well 2308320011, Mississippi Interior Salt Basin.

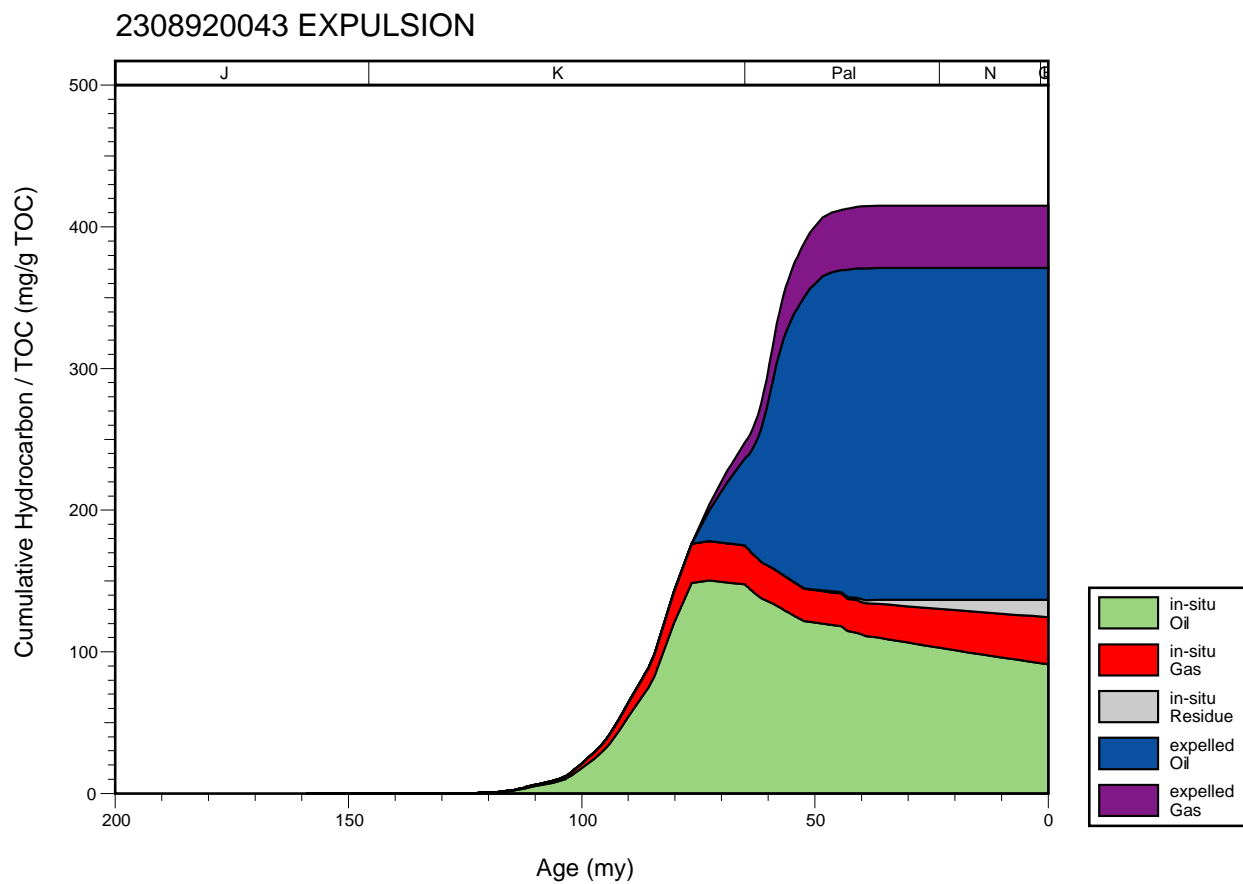


Figure 122. Hydrocarbon expulsion plot for well 2308920043, Mississippi Interior Salt Basin.

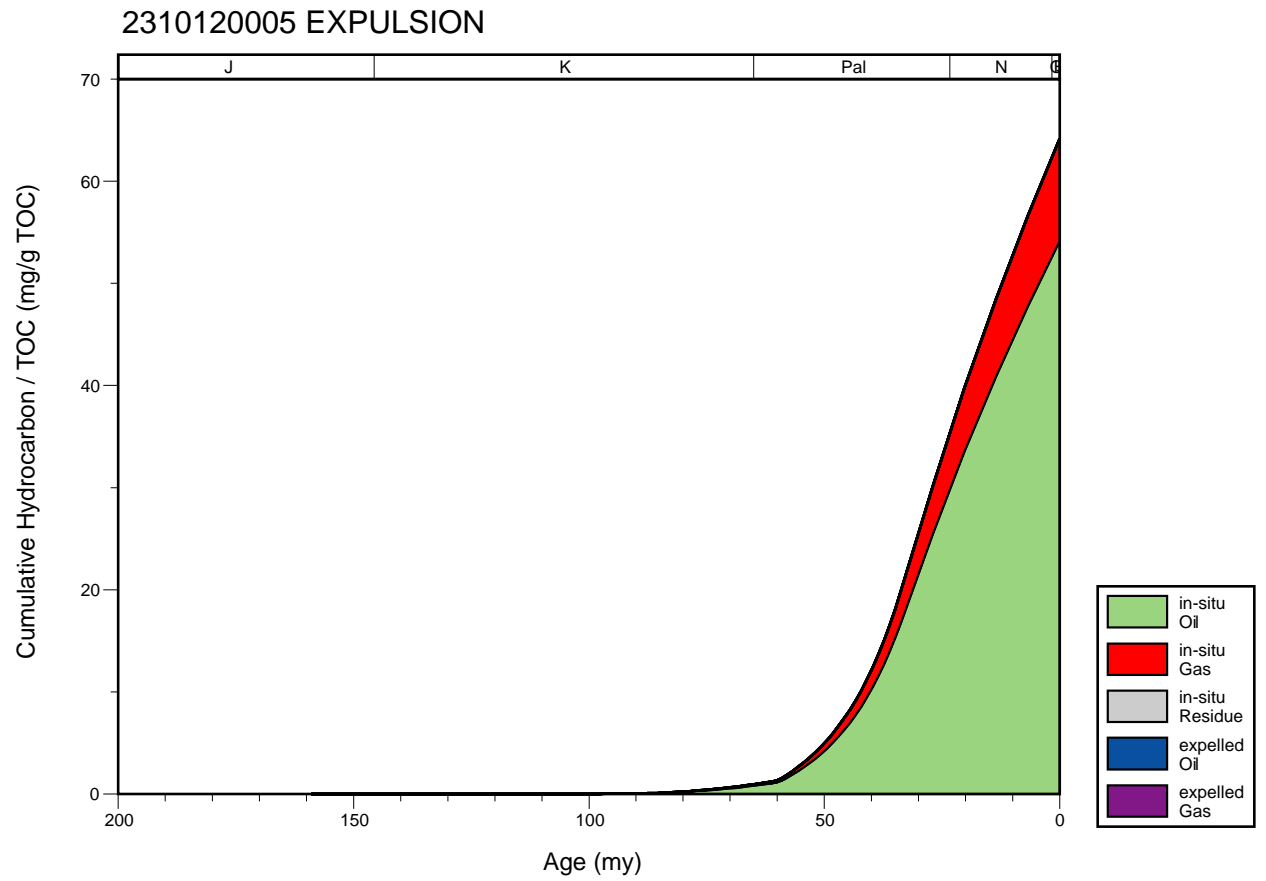


Figure 123. Hydrocarbon expulsion plot for well 2310120005, Mississippi Interior Salt Basin.

# 2311100069 EXPULSION

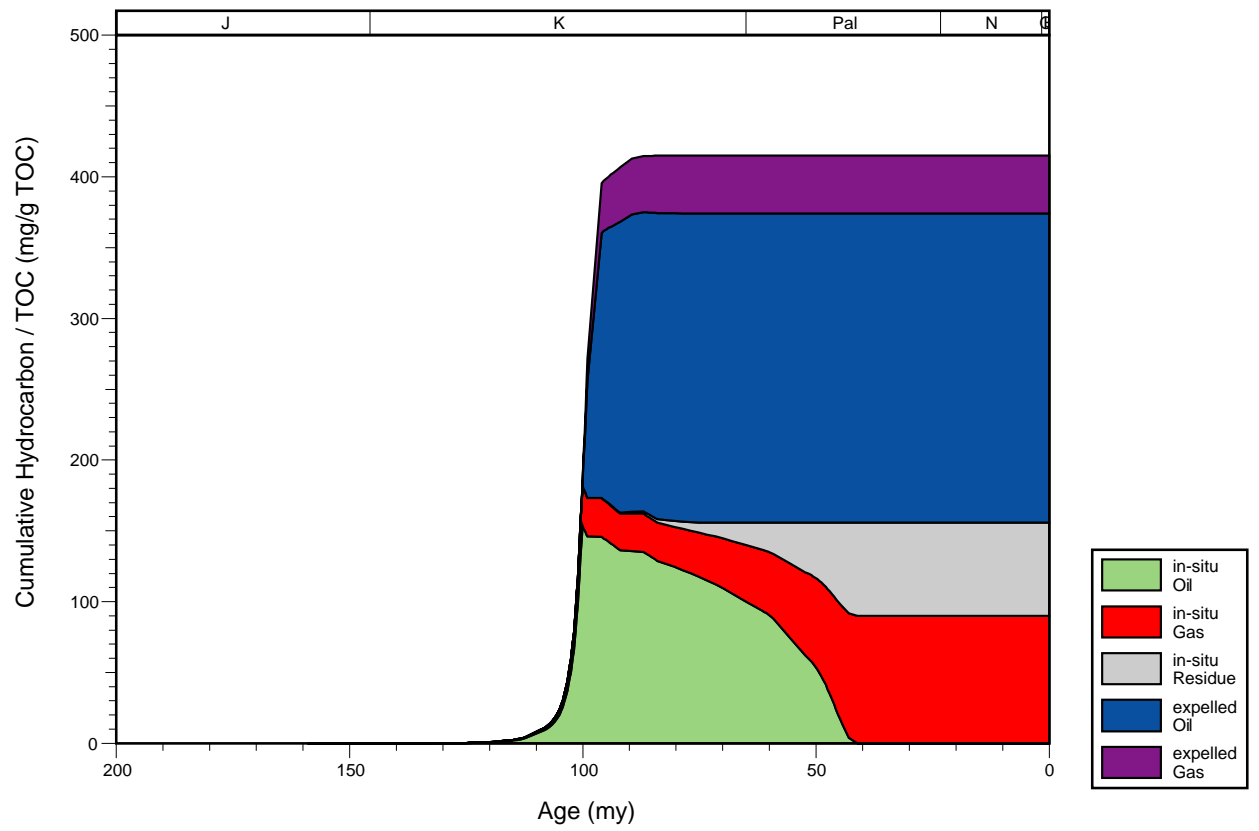


Figure 124. Hydrocarbon expulsion plot for well 2311100069, Mississippi Interior Salt Basin.

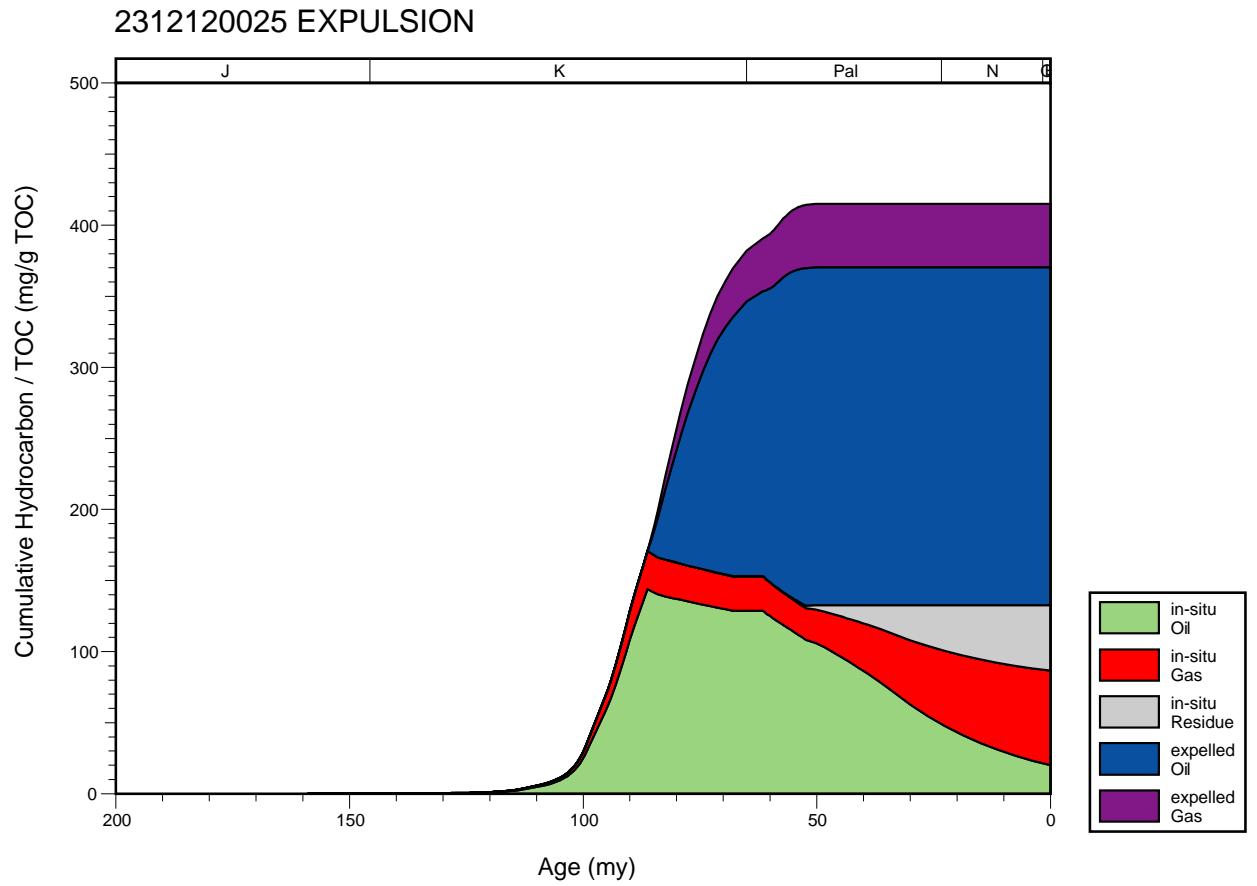


Figure 125. Hydrocarbon expulsion plot for well 2312120025, Mississippi Interior Salt Basin.

# 2312520004 EXPULSION

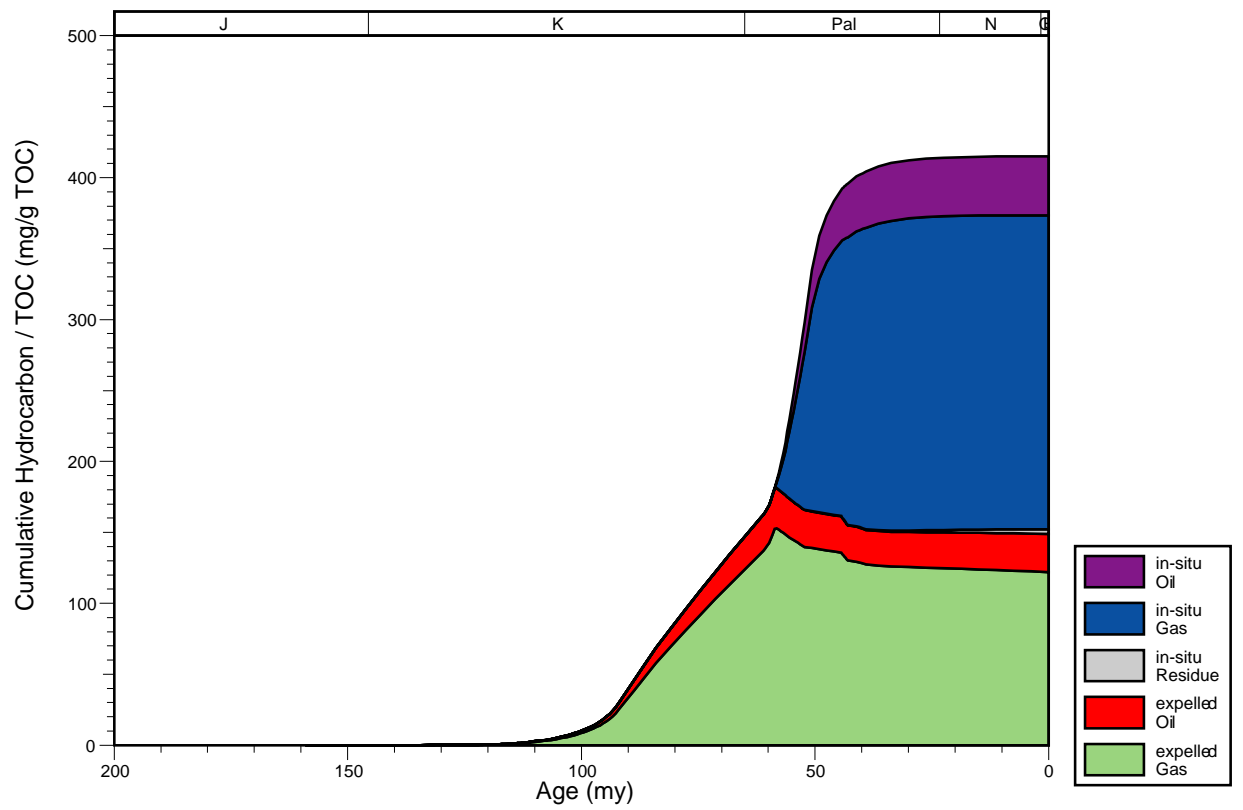


Figure 126. Hydrocarbon expulsion plot for well 2312520004, Mississippi Interior Salt Basin.

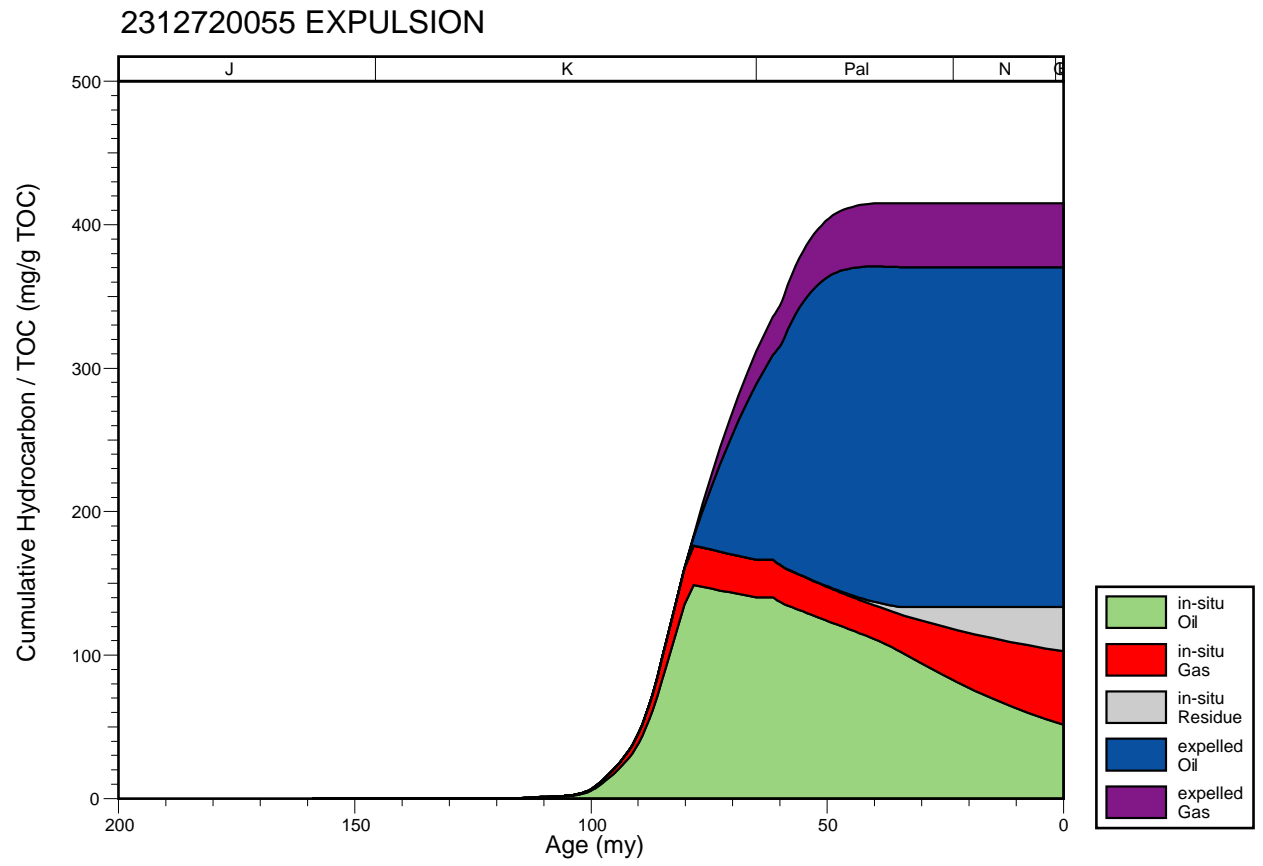


Figure 127. Hydrocarbon expulsion plot for well 2312720055, Mississippi Interior Salt Basin.

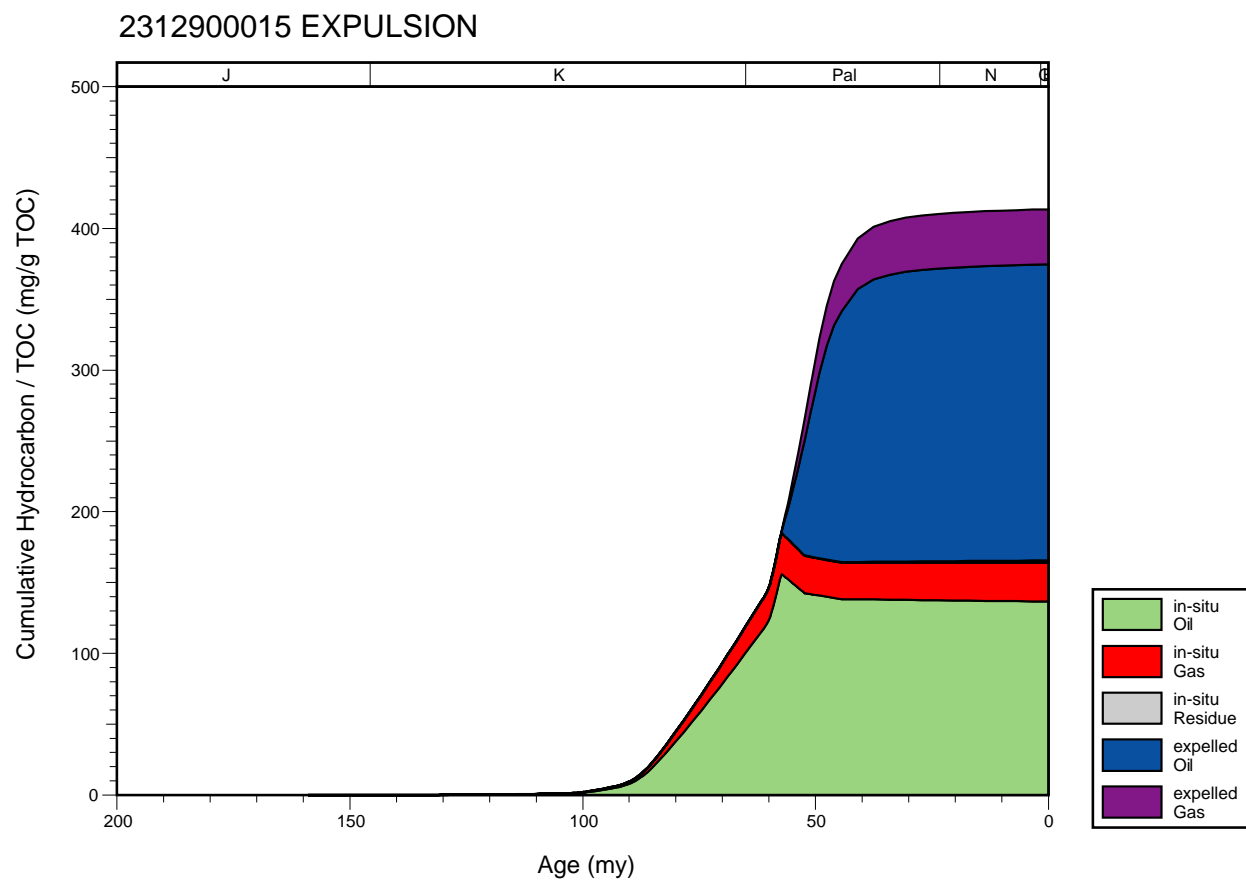


Figure 128. Hydrocarbon expulsion plot for well 2312900015, Mississippi Interior Salt Basin.



## 2312900061 EXPULSION

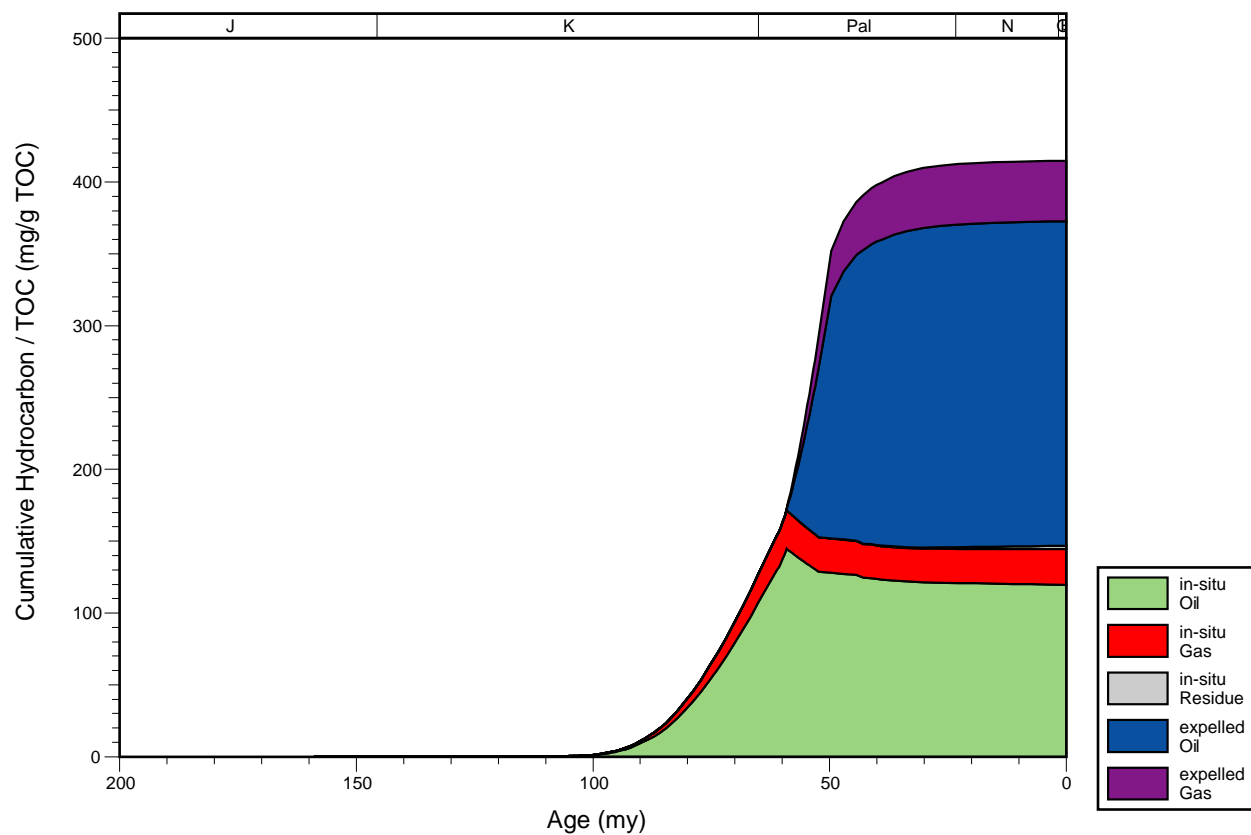


Figure 129. Hydrocarbon expulsion plot for well 2312900061, Mississippi Interior Salt Basin.

## 2312900178 EXPULSION

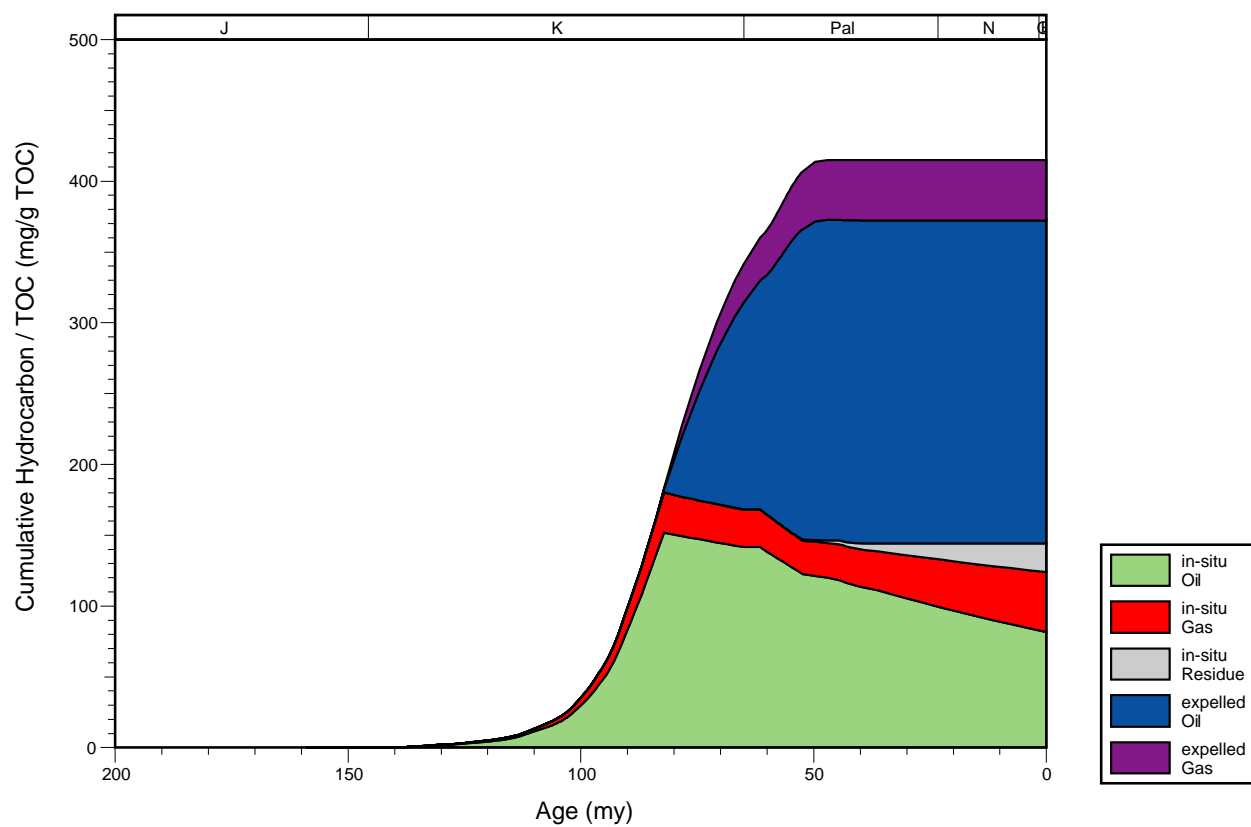


Figure 130. Hydrocarbon expulsion plot for well 2312900178, Mississippi Interior Salt Basin.

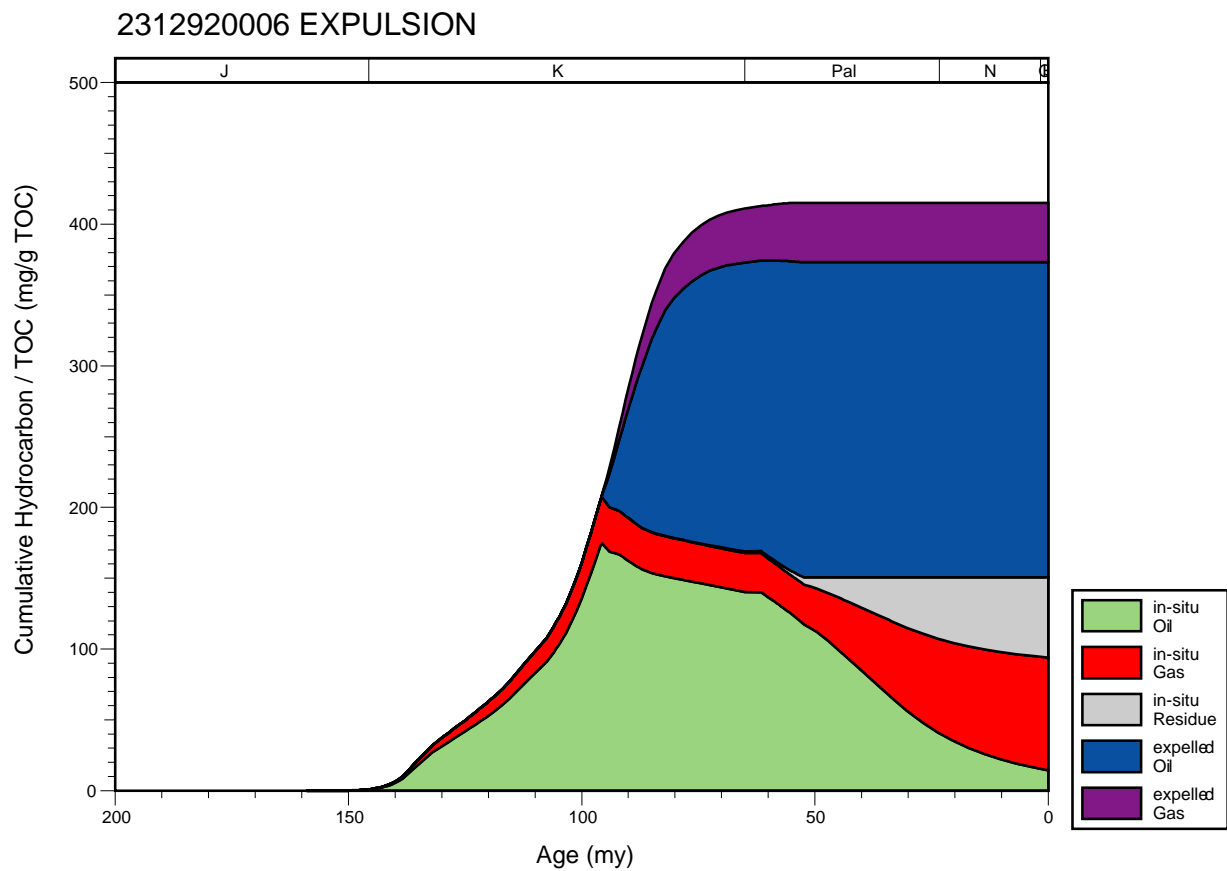


Figure 131. Hydrocarbon expulsion plot for well 2312920006, Mississippi Interior Salt Basin.

# 2312920057 EXPULSION

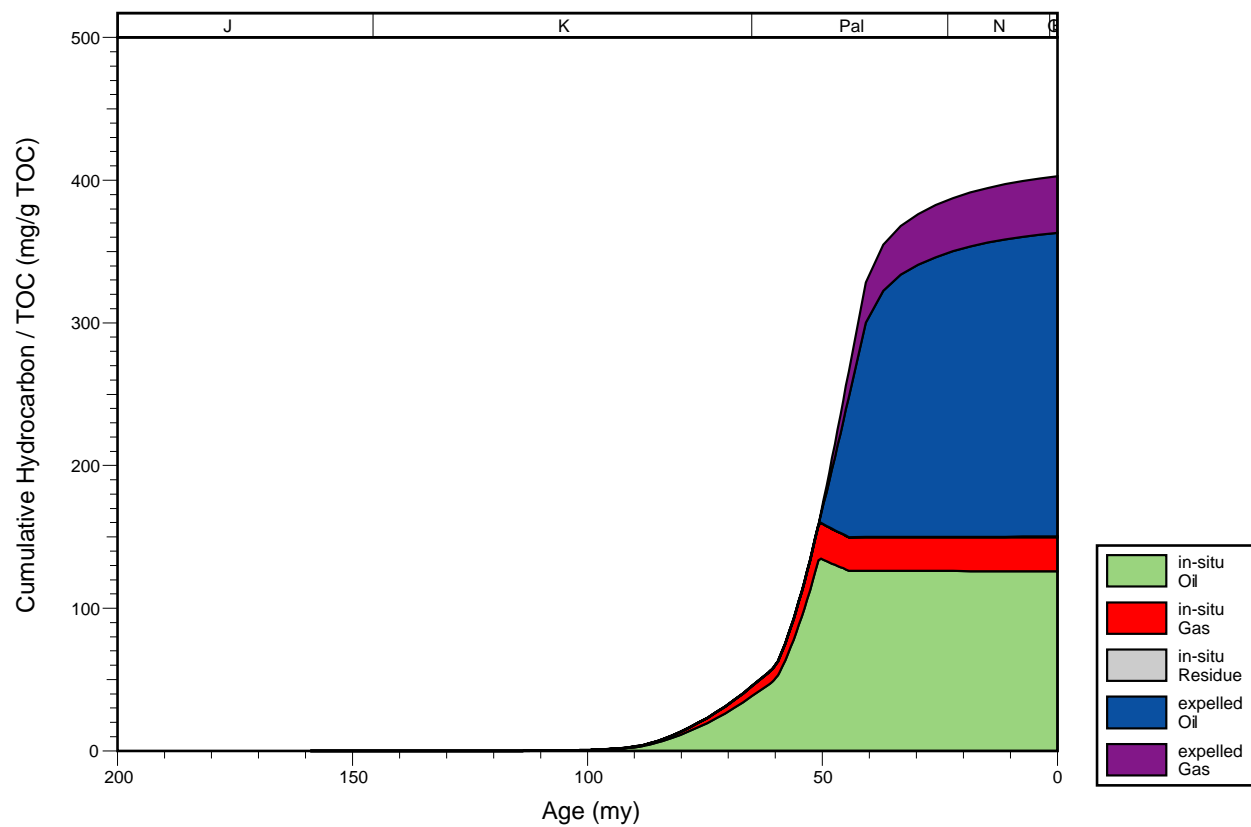


Figure 132. Hydrocarbon expulsion plot for well 2312920057, Mississippi Interior Salt Basin.

# 2312920122 EXPULSION

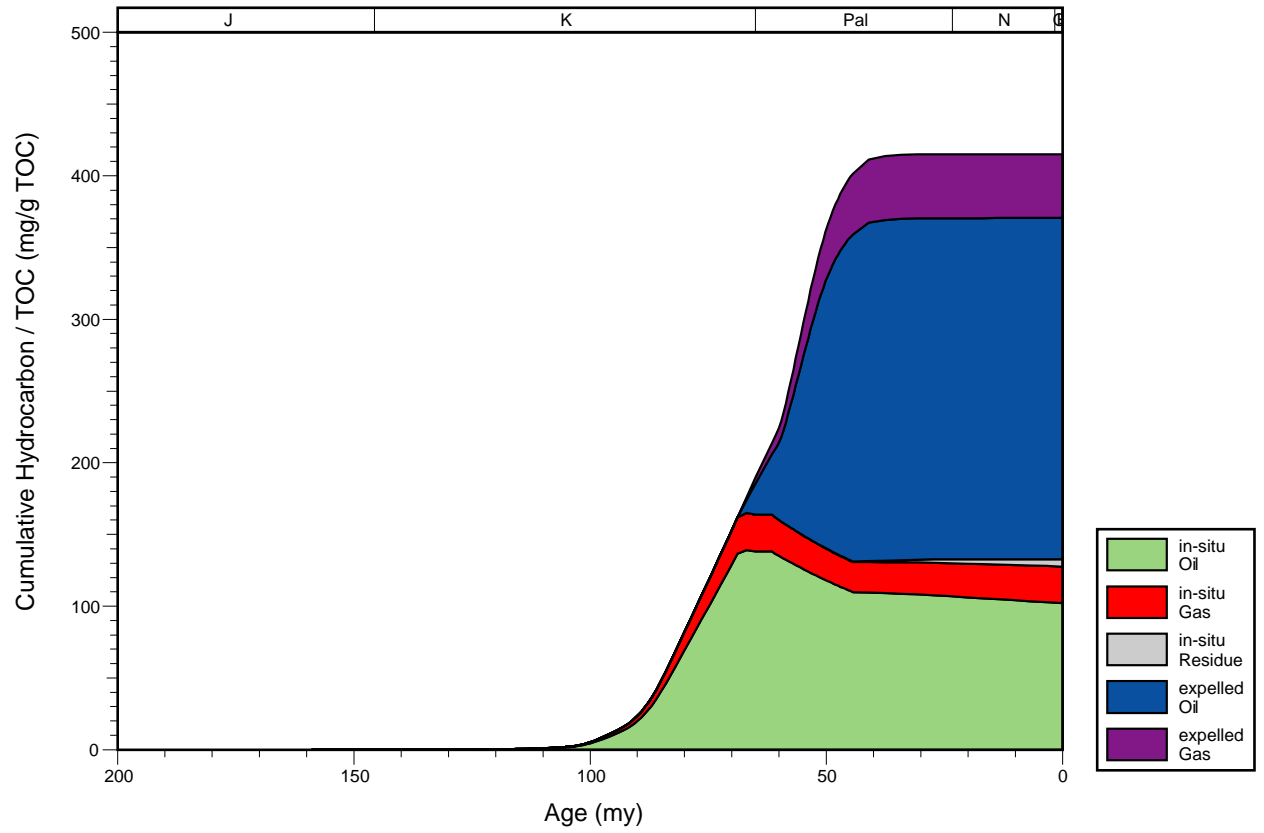


Figure 133. Hydrocarbon expulsion plot for well 2312920122, Mississippi Interior Salt Basin.

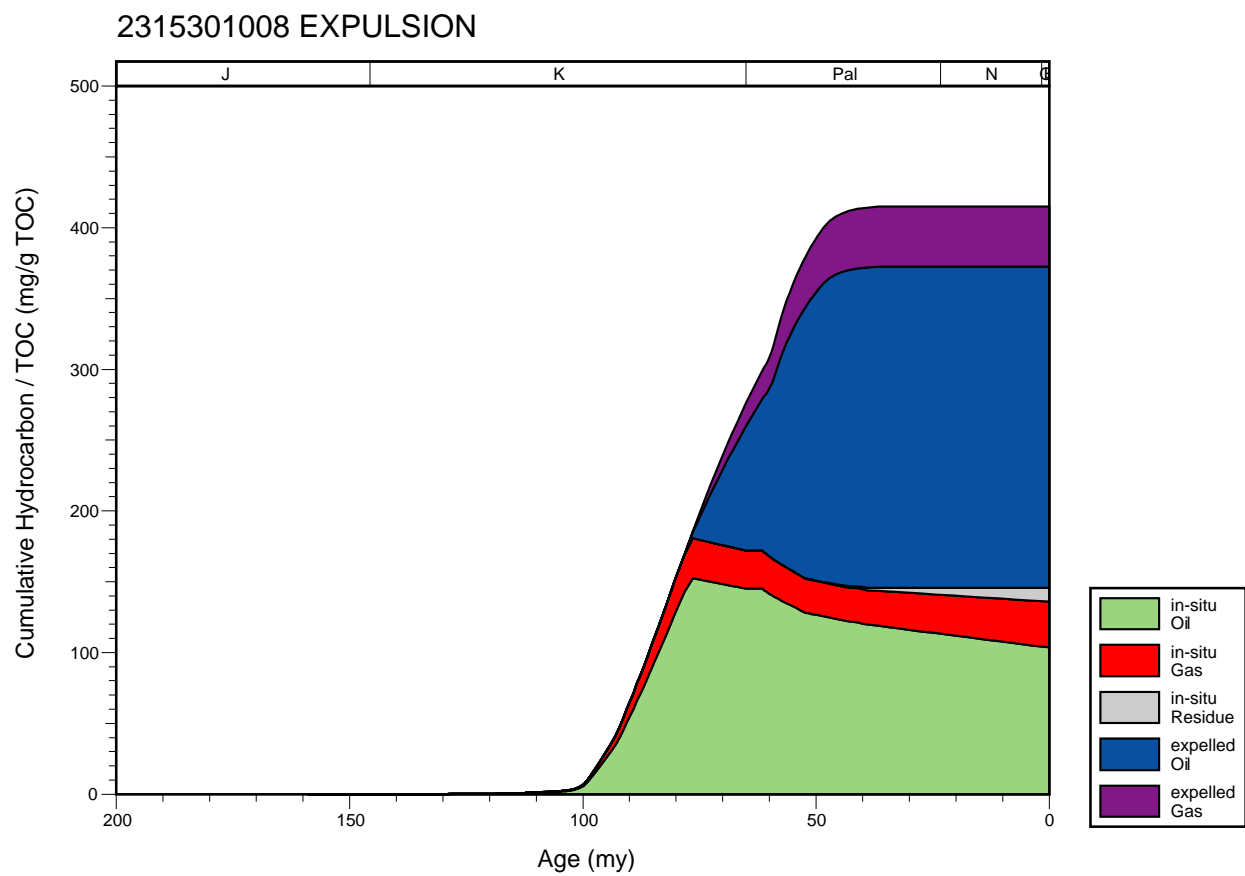


Figure 134. Hydrocarbon expulsion plot for well 2315301008, Mississippi Interior Salt Basin.

# 2315320042 EXPULSION

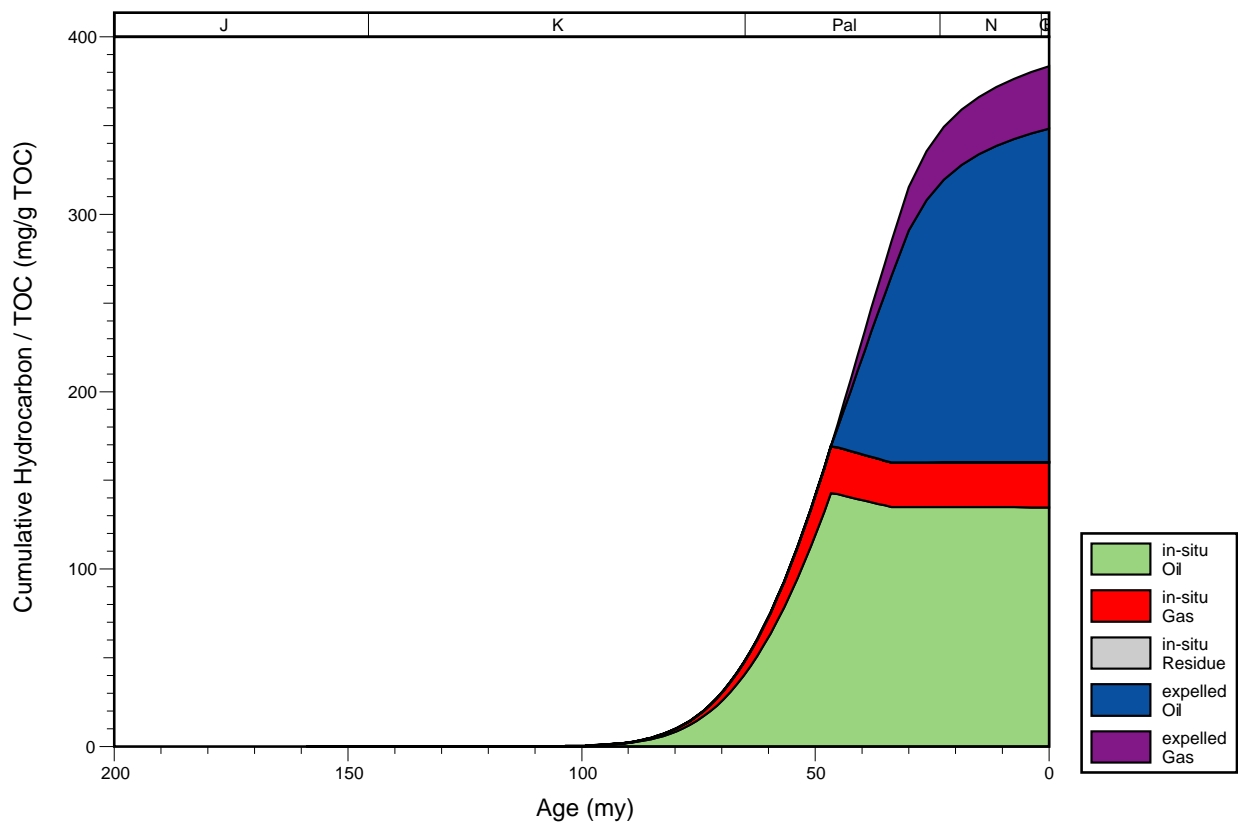


Figure 135. Hydrocarbon expulsion plot for well 2315320042, Mississippi Interior Salt Basin.

# 2315320077 EXPULSION

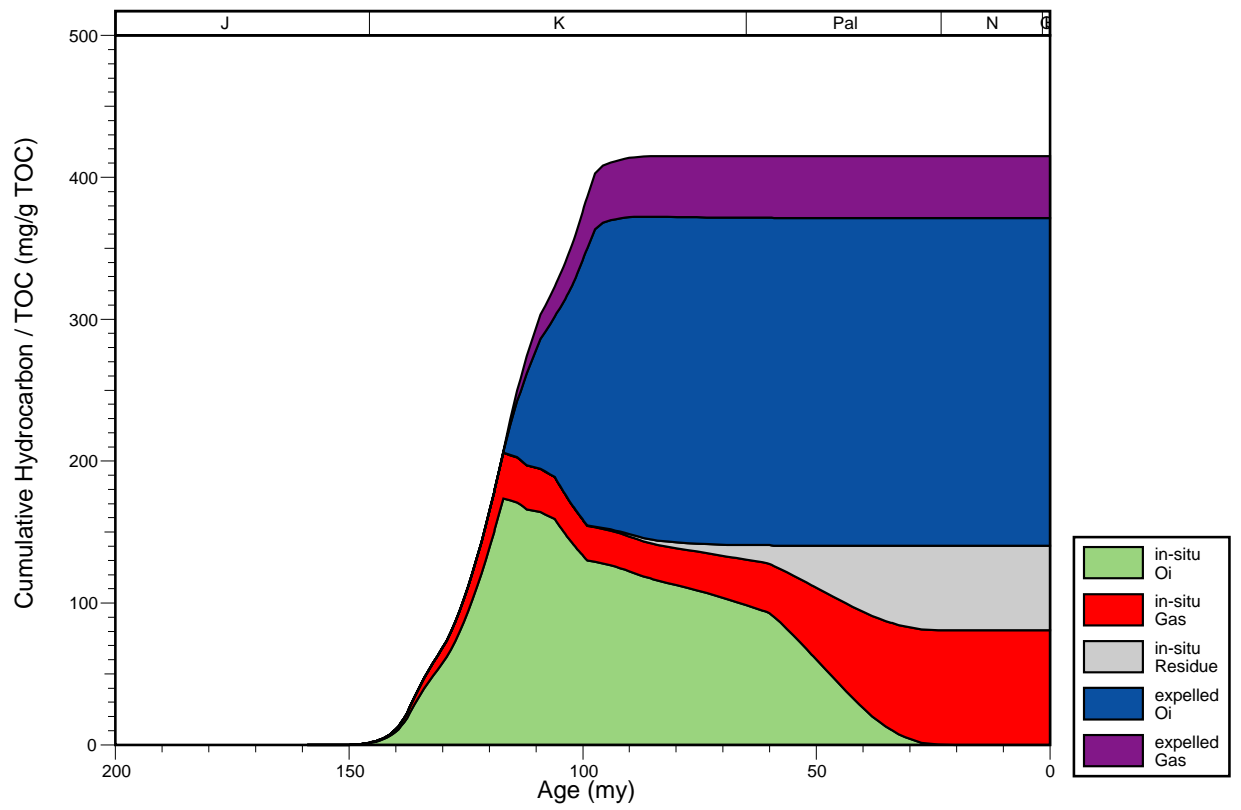


Figure 136. Hydrocarbon expulsion plot for well 2315320077, Mississippi Interior Salt Basin.



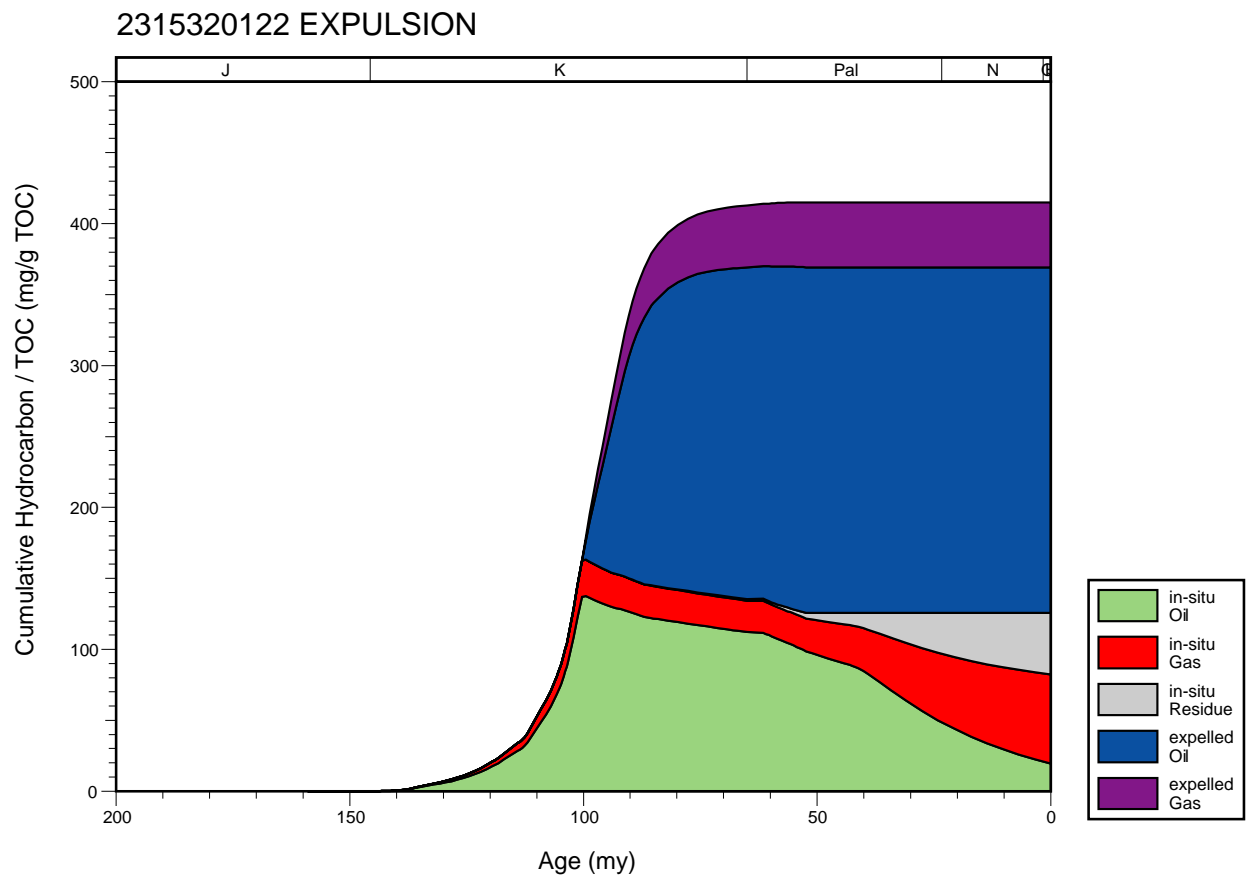


Figure 137. Hydrocarbon expulsion plot for well 2315320122, Mississippi Interior Salt Basin.

# 2315320232 EXPULSION

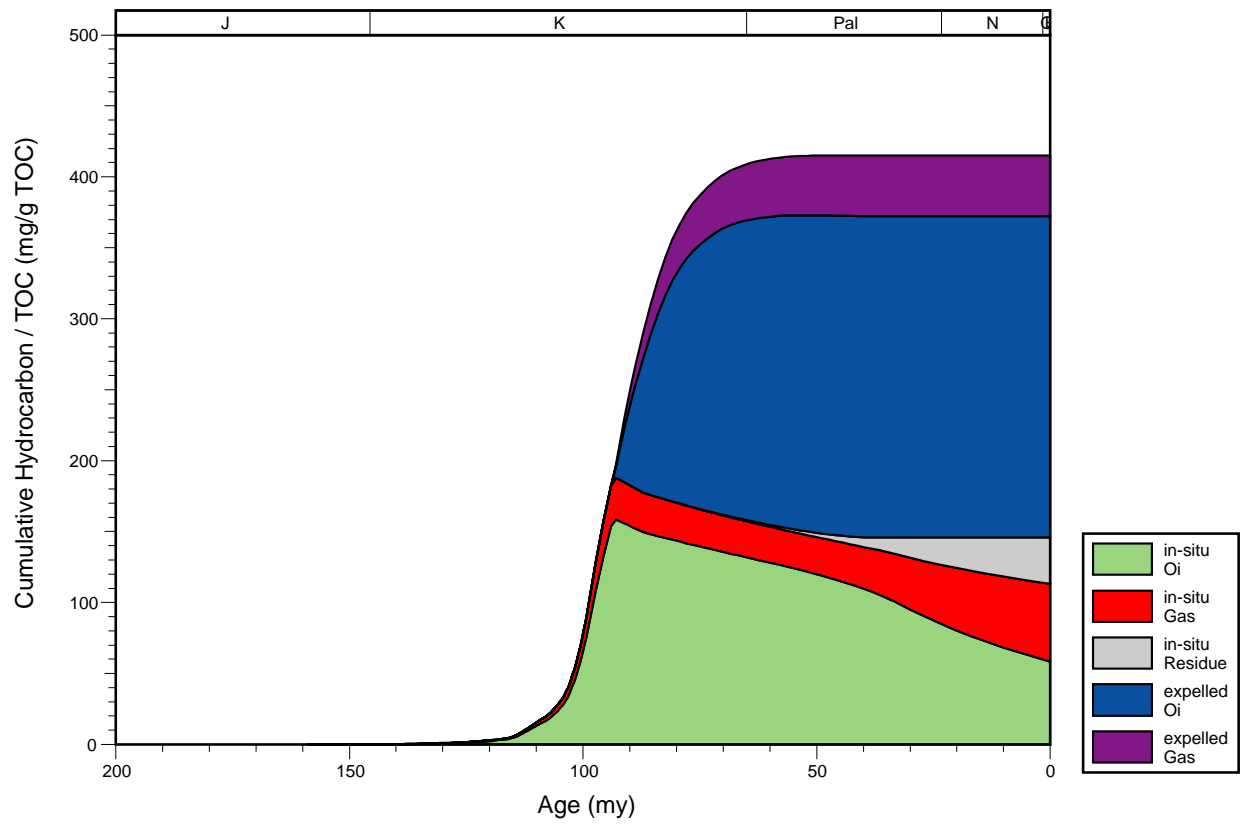


Figure 138. Hydrocarbon expulsion plot for well 2315320232, Mississippi Interior Salt Basin.

# 2315320265 EXPULSION

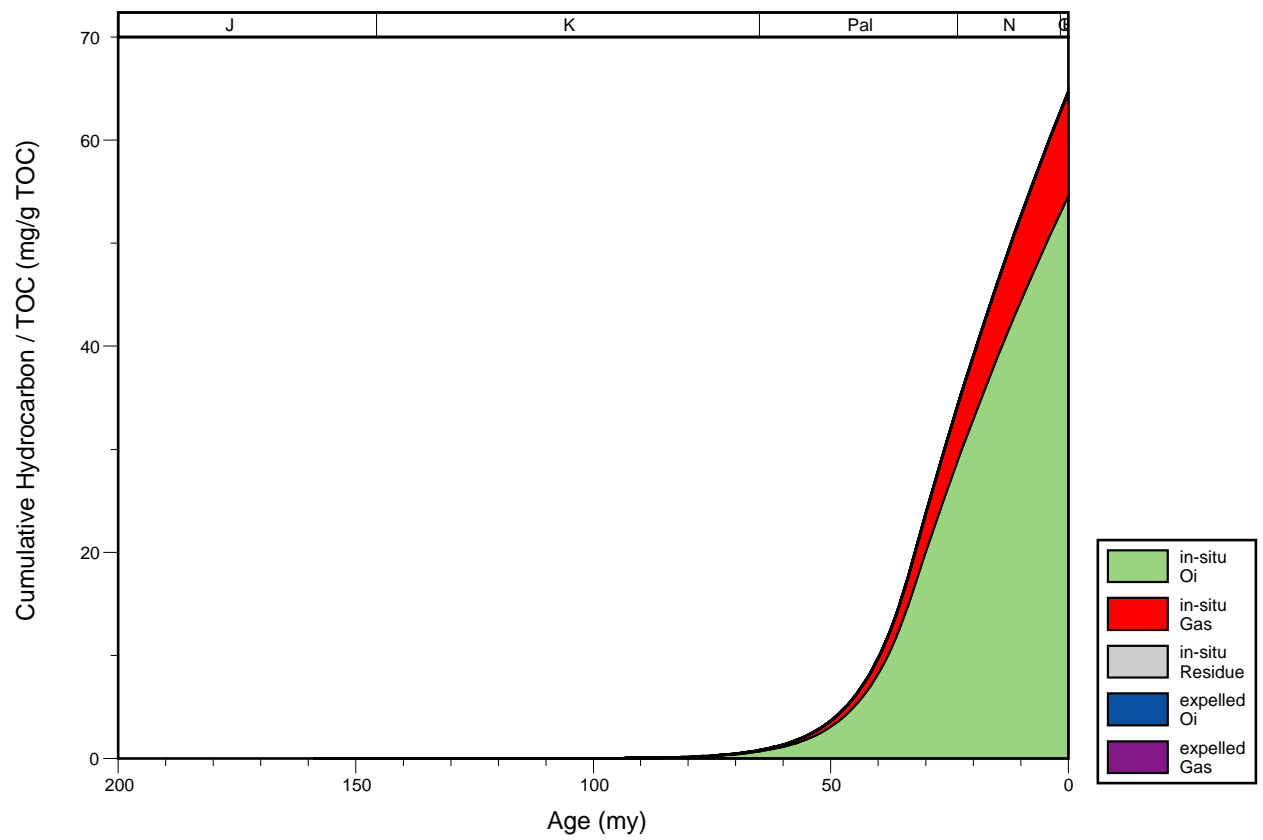


Figure 139. Hydrocarbon expulsion plot for well 2315320265, Mississippi Interior Salt Basin.

# 2315320545 EXPULSION

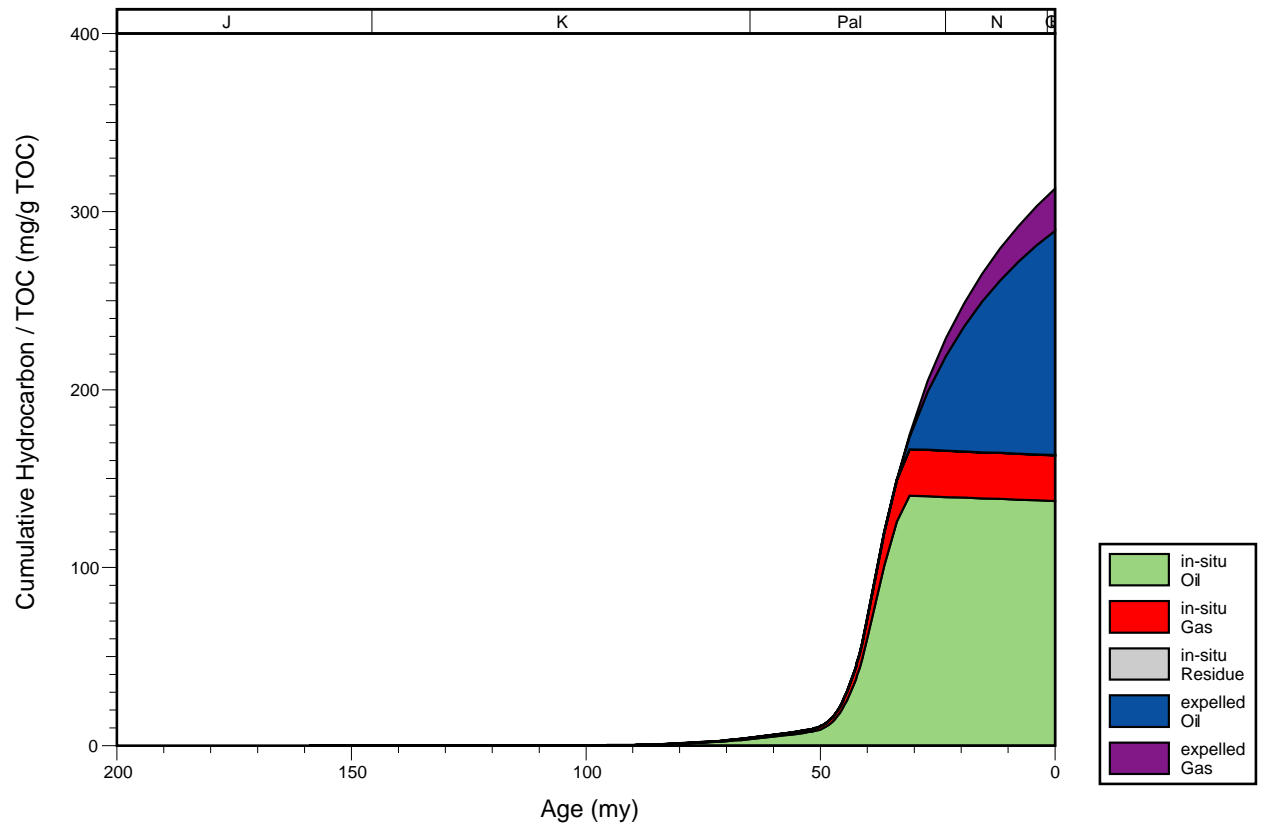


Figure 140. Hydrocarbon expulsion plot for well 2315320545, Mississippi Interior Salt Basin.

# 2316300049 EXPULSION

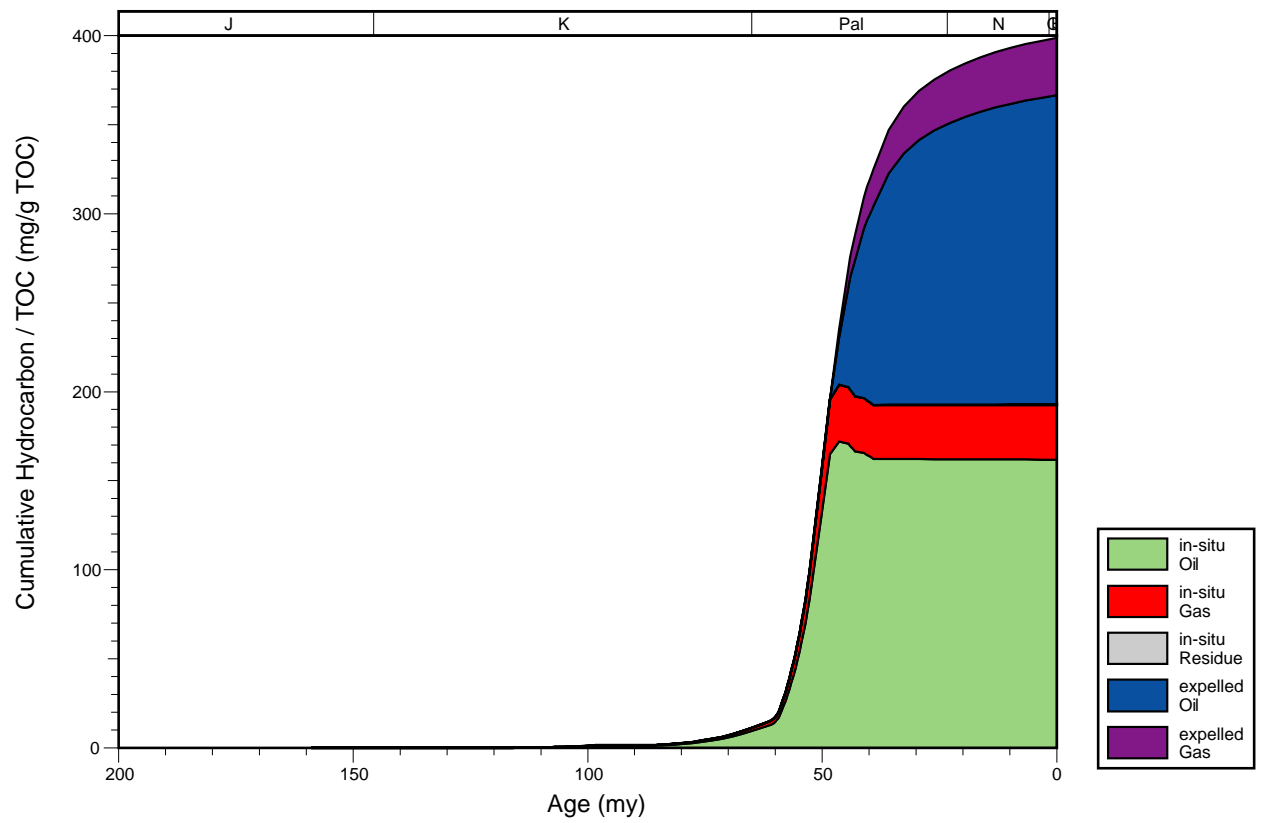


Figure 141. Hydrocarbon expulsion plot for well 2316300049, Mississippi Interior Salt Basin.

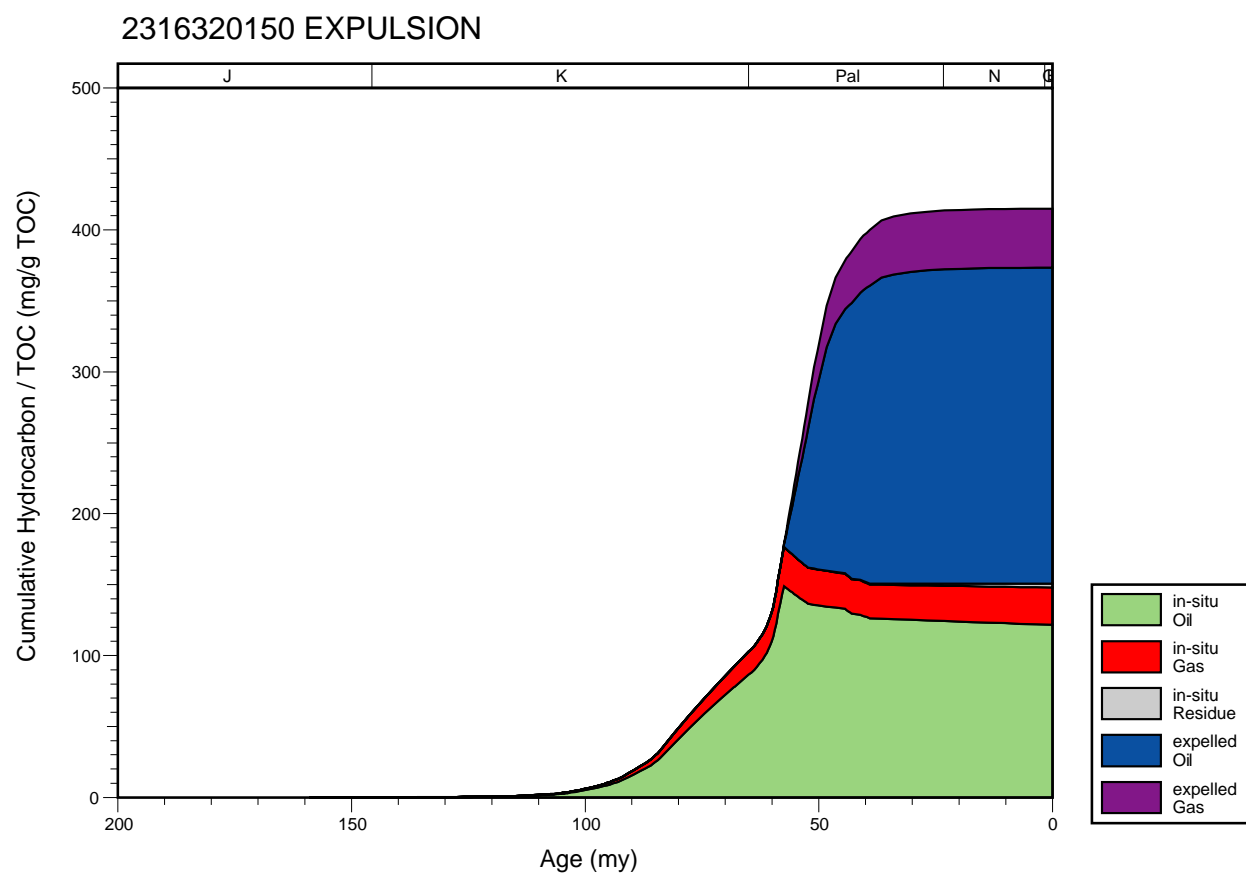


Figure 142. Hydrocarbon expulsion plot for well 2316320150, Mississippi Interior Salt Basin.